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ARCTIC LICHEN OPPORTUNITIES

John W. Thomson
Department of Botany
University of Wisconsin
Madison, WI 53706

While the tropical regions of the earth are currently emphasized as needing study before the explosive population growth of man overwhelms the native vegetation, it may also be pointed out that the arctic regions are also threatened and are in great need of study.

It is only recently that professional lichenologists have personally worked in the American arctic. Since World War II the arctic has been more easily reached by use of many types of aircraft, but few professional lichenologists have worked in the field. In the American sector M. E. Hale, Jr., Barbara Murray, C. D. Bird, Sam Shushan, H. Krog, I. M. Brodo, W. A. Weber, Teuvo Ahti, and the writer have been the principal lichenologists who have worked in the arctic and subarctic. Immensely valuable collections from many sections of the arctic have been made by the Canadian Wildlife Officer, G. W. Scotter. Much more yet remains to be done as many areas are relatively unknown. Because the geology of the arctic is complex, many variations of topography and substratum exist. The Labrador area has scarcely been touched. Many of the arctic islands are terra incognita, the Canadian arctic is only sampled, the intriguing interior unglaciated northern Yukon area of the British Mountains and vicinity, the Bering Straits coastal area, all need much further exploration. Little is known of the unglaciated north end of Greenland.

The history of American arctic lichenology dates from the early 19th century when a number of voyages by professional explorers probed the Canadian Eastern Arctic, principally motivated by the search for a sea route via the Northwest Passage. The few lichen collections were obviously very fragmentary representations of the vegetation and obtained only incidental to the other activities of the explorers. They were collected by such as Commander John Ross who obtained 9 lichens in Baffin Bay region in 1818, actually probably collected by Lieutenant Edward Parry, second in command, as Parry on later voyages also collected small numbers of lichens. On these as on other voyages, the surgeons also served as plant collectors. In this age of chemical medicines it may be forgotten that at that time an extensive training in botany was usually given medical students, the better to utilize herbal sources of medicines. The largest early collections coming from the eastern arctic were made by Captain H. W. Feilden of the Alert and Mr. H. C. Hart of the Discovery, ships which were on the Nares Expedition of 1875-1876. In these collections Theodore Fries found 102 species, some new to science. Missionaries to Canada also contributed to exploration of the region. A Moravian brother collected in Labrador prior to 1830, and Rev. A. C. Waghorne collected in Labrador and Newfoundland. His lichens were reported upon by Eckfeldt and Arnold in 1895-1896. The most complete works giving access to the taxonomy of the arctic lichens were the numerous papers by Bernt Lynge of Oslo. The papers mainly dealt with Greenland but also the Canadian Eastern Arctic, Spitzbergen, Novaya Zemlya, and numerous other arctic localities.

For those interested in the lichens of the American arctic, summaries of the expeditions and their scientific reports are in the following:

Canadian Eastern Arctic--Bernt Lynge in National Museum of Canada Bulletin 97: 298-369. 1947.

Greenland--Eilif Dahl in Meddel. om Grønl. 150: 1-70. 1950.

Interior Canada--C. D. Bird, J. W. Thomson, A. H. Marsh, G. W. Scotter and P. Y. Wong in Canad. Jour. Bot. 58: 1947-1985. 1980; 59: 1231-1252. 1981.

Alaska--Hildur Krog in Norsk. Polarinstitut Skrift. 144: 1-180. 1968.

A remarkably excellent coverage for Siberia is in V. P. Savicz and A. A. Elenkin, Introduction to the lichen flora of the Asiatic section of the U.S.S.R., a contribution of the Komarov Institute, Trudy Series 2, 6: 181-343. 1950, which lists 401 references and although in Russian relists for each reference the species originally cited. A manual for the macrolichens of the American arctic has been prepared by the writer and is now in print with the Columbia University Press (Thomson, J. W. 1984. American Arctic Lichens 1. The Macrolichens. xi + 504 pp.). A matching volume on the microlichens is still in preparation. It would be an understatement to say that the arctic is vast. Truly, the intensive work in the arctic has given us but a sampling and an indication of where much further work needs to be done.

The geological complexities of the arctic remain for exploration for their influences on the distribution and ecology of arctic lichens. Crystalline rocks abound in the mountain chain in the eastern arctic from Labrador, through Baffin Island to Ellesmere Island. Sedimentary rocks of many differing types are on the arctic islands. The northern mainland Canadian coast has a very complex geology which also needs further exploration. And the Cordilleran region with its many ranges and conditions needs much more work.

In arctic lichen ecology a fine series of studies have been appearing under the aegis of Larry Bliss and his students. We need yet more complete descriptions of the vegetation types both in Braun-Blanquet and ordination terms. Contrary to common misconceptions, the arctic tundras are not a uniform covering of one mass from coast to coast but an intricate series of communities reflecting the climate, the substrate, and the complex interrelationships of the plants. It is really appalling to find so many arctic vegetational studies grossly considering "lichens" and "mosses" as if these were all alike with no species differences. What does this reflect as to the training of our plant ecologists? A large percentage of the arctic ground cover consists of these neglected plants. The role of air pollution in its influence on vegetation is becoming increasingly obvious. Do not think that the arctic is so far north that it will remain immune. The episodes of radioactive fallout effects have already become well known in their effects on the short cycle of lichens→caribou→man. As the arctic becomes increasingly subject to development with cities, pipelines, drilling, mining, and other activities, we shall see an increasing injection of pollutants into the atmosphere which rapidly circles the top of the world and which is already being documented. We need studies which record the present vegetation as well as the changes which the pollutants bring about.

In working with the arctic crustose lichens it has become most apparent to the writer that there is a need for revisionary work in most of the genera. The outlook of the past considered that the parts of the arctic were so widely separated that species must be endemic to smaller areas. Yet the major number of species now prove to be circumpolar. This means that a broader study will reduce many of the names in the literature to synonymy. In addition, however, a surprisingly large proportion of the crustose lichens are represented by so few specimens in the herbaria that it is not yet possible to state what their ranges really are. A strong effort needs to be made to obtain greater information on the species of crustose lichens occurring in arctic habitats. Even though the crustose lichens are more difficult to identify because one must handle more minute characters than with the larger, more popular, species, they are not impossible to learn. The greatest problem with them in field collecting is that so many arctic crustose species look alike in the field. Often one cannot even recognize the genus without sectioning the apothecia and studying the section and spores. Such problems point up the need for the lichen student to have an intuitive feel and a knowledge of habitat preferences in surveying the lichen flora of an arctic region. Certainly great contributions to knowledge of the arctic remain to be made with further field and herbarium studies of the crustose lichens.

Whether one is interested in taxonomy, geographic distributions, ecology, or the impact of man on the arctic environment, the opportunities beckon the researcher to the study of the American arctic.

BRYHNIA GRAMINICOLOR NEW TO FLORIDA

Herbert J. Cash
Biology Department
Okaloosa-Walton Junior College
Niceville, FL 32578

Betty J. Rapp
18 Marlborough Road
Shalimar, FL 32579

We collected Bryhnia graminicolor at Florida Caverns State Park (Jackson County) on April 14, 1984, on a limestone wall outside the visitors' cave entrance. Many other bryophytes including Eurhynchium hians, Thuidium minutulum, Anomodon rostratus, A. attenuatus, Fissidens taxifolius and Gymnostomum angustifolium were collected in the same area. This is apparently a new record for the Gulf coast. The specimen was identified by B. J. Rapp and verified by Lewis E. Anderson. Vouchers are deposited in DUKE, LAF and MICH.

ERRATUM: In Evansia 1(2) I incorrectly indicated that Coppins & James reported Placynthiella icmalea (Ach.) Coppins & James from Ohio. They actually reported P. hyporhoda (Th. Fr.) Coppins & James. The rest of the discussion does apply to P. icmalea which is also new to North America.

Richard C. Harris

THE GENUS PLAGIOTHECIUM IN NORTH AMERICA

Robert R. Ireland
National Museum of Natural History
National Museums of Canada
Ottawa, Ontario, Canada K1A 0M8

Many pleurocarpous mosses make bryologists cringe when they try to identify them. The genus Plagiothecium is no exception, as it is infamous for containing troublesome species. The genus is in the Plagiotheciaceae, which is considered monotypic by Buck & Ireland (1985) who recently clarified the taxonomy of the family. Since the last treatment of Plagiothecium for North America (Ireland 1969) did not cover the Mexican species and as it is now somewhat outdated in regard to the distribution of some species, it seems advisable to present a brief account of the genus as I understand it today.

Plagiothecium B.S.G.

Plants often glossy, in dark green to yellowish green, sometimes whitish green, thin to dense, flat mats or occasionally somewhat erect tufts. Stems usually complanate-foliate, sometimes julaceous, simple or irregularly branched; outer layer of stem cells large and thin-walled in cross-section; rhizoids sometimes present below leaf insertion, smooth; pseudoparaphyllia none. Leaves ovate, ovate-lanceolate, oblong-lanceolate or oblong-ovate, acute, acuminate, rarely piliferous, often concave, smooth or undulate, often asymmetric, decurrent; costae short and double, one branch sometimes reaching midleaf, or rarely ecostate, rhizoids at base on dorsal surfaces or adjacent cells, sometimes at leaf tips, smooth; leaf cells thin-walled, smooth or rarely with minute cuticular roughenings; upper cells linear, linear-flexuose or sometimes linear-rhomboidal; alar cells differentiated, equally distributed on either side of costa, extending into decurrencies as spherical, oval, quadrate or rectangular cells. Brood bodies often present, 2-7-celled, cylindrical or fusiform, uniseriate, clustered in leaf axils or sometimes on abaxial surface of leaves. Autoicous or dioicous. Setae smooth, long, twisted, straight to somewhat flexuose; capsules cernuous or erect, straight or curved, exothecial cells thin- or thick-walled; peristome perfect, hypnaceous, cilia sometimes rudimentary or lacking; annulus present, often persistent; operculum conic to rostrate; calyptrae cucullate, smooth, naked.

1. Plants whitish green, robust, stems 5-15 cm long; leaves strongly undulate, often 4 mm long or more...... 1. P. undulatum
1. Plants dark green to yellowish green, medium-sized to small, stems 2-6 cm long; leaves smooth or undulate, usually less than 4 mm long.................................. 2
  2. Leaf apex abruptly contracted to a long-filiform, flexuose acumen, sometimes 1/3 length of leaf....... 2. P. piliferum
  2. Leaf apex not abruptly contracted to a filiform acumen........... 3
    3. Leaf decurrencies composed on many inflated, quadrate to spherical cells; leaf margin broadly recurved nearly to apices.................... 5. P. denticulatum
    3. Leaf decurrencies composed of mostly rectangular cells; leaf margins plane or narrowly recurved................ 4
      4. Leaves symmetric and concave............................ 5

5. Plants large, stems to 4 cm long, 1-4 mm wide; leaves often imbricate with tips recurved when dry, median cells 7-17 µm wide; occurring in mesic to somewhat xeric habitats.......................... 3. P. cavifolium

5. Plants small, stems to 2 cm long, 1-3 mm wide; leaves erect-spreading with straight tips, median cells 4-10 µm wide; occurring in hydric habitats..................... 4. P. latebricola

4. Leaves asymmetric and flat.................................. 6

6. Plants small, stems to 2 cm long, 1-3 mm wide; leaves without rhizoids at tips, median cells 4-10 µm wide; capsules short, mostly 1 mm long; common in northern part of United States and Canada, south in the mountains................................... 6. P. laetum

6. Plants large, stems to 3 cm long, 2-4 mm wide; leaves often with clusters of rhizoids at tips, median cells 9-14 µm wide; capsules long, to 2 mm; rare, only in Mexico....... 7. P. schraderi

1. Plagiothecium undulatum (Hedw.) B.S.G. Figs. 1-6

The most distinctive species of Plagiothecium in North America because of its large size, stems to 15 cm long and 7 mm wide, strongly undulate leaves and whitish green color. The plants are generally prostrate and complanate-foliate but sometimes they can be erect and julaceous in more strongly illuminated and moister habitats. Microscopic, minute, granular, cuticular roughenings cover the leaf cells. The plants are dioicous, frequently bearing sporophytes that have long (2.5-4.5 cm) setae and inclined to pendulous capsules with wrinkled urns, 1.5-4.0 mm long.

Habitat: At low altitudes in coniferous woods on rotten logs, stumps and bases of trees; sometimes on boggy soil or soil and humus overlying rock.

Distribution: Only in western North America from Alaska, Aleutian Islands, British Columbia, Washington, Oregon, California and Idaho; Europe and Asia.

2. Plagiothecium piliferum (Hartm.) B.S.G. Figs. 7-10

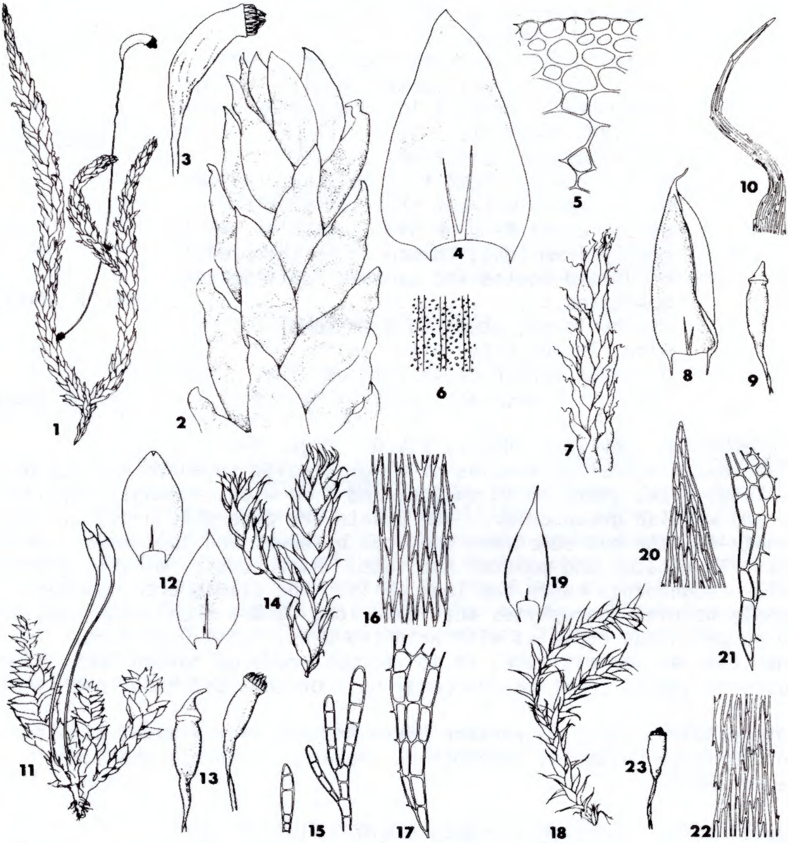
Easily recognized by the glossy, symmetric, concave leaves, 0.8-2.0 mm long, abruptly contracted to a long-filiform, flexuose acumen, sometimes reaching 1/3 the leaf length. The leaf margins are narrowly recurved almost throughout and are entire or minutely serrulate at apex. The plants are autoicous, the setae are 0.8-1.5 cm long, bearing straight, erect capsules with smooth urns, 1-4 mm long.

Habitat: At low elevations in coniferous or alder-maple woods on trees, rotten logs and noncalcareous cliffs and boulders; sometimes on wood in swampy areas.

Distribution: Predominantly in western North America from Alaska, Northwest Territories (Great Bear Lake), British Columbia, Washington, Oregon, California, Idaho and Montana; disjunct to northern Quebec (James Bay) and southwestern Greenland; Europe and Asia.

3. Plagiothecium cavifolium (Brid.) Iwats. Figs. 11-17

A species recognized primarily by its pale green to yellowish green color, subjulaceous stems to 3 cm long, symmetric, imbricate, strongly



Figures 1-6. P. undulatum.--1. Habit, x 3/4.--2. Enlargement of stem, x 5.--3. Capsule (dry), x 6.--4. Leaf, x 8.--5. Stem cross-section, x 112.--6. Cuticular roughenings on leaf, x 375.

Figures 7-10. P. piliferum.--7. Habit, x 4.--8. Leaf, x 14.--9. Capsule (dry), x 6.--10. Apical leaf cells, x 112.

Figures 11-17. P. cavifolium.--11. Habit, x 1½.--12. Leaves, x 8.--13. Capsules (dry), x 6.--14. Enlargement of stem, x 4.--15. Brood bodies, x 150.--16. Median leaf cells, x 112.--17. Decurrent leaf cells, x 112.

Figures 18-23. P. latebricola.--18. Habit, x 4.--19. Leaf, x 14.--20. Apical leaf cells, x 112.--21. Decurrent leaf cells, x 112.--22. Median leaf cells, x 112.--23. Capsule (dry), x 6.

concave leaves, 1-3 mm long, median cells 7-17 µm wide, plane margins, and leaf tips recurved when dry. Complanate-foliate plants with flagelliform stems that are attenuate at the apices often occur in some colonies. The leaf decurrencies taper and are composed of mostly rectangular cells. Brood bodies are sometimes present. The plants are dioicous, seldom producing the characteristic sporophytes with setae 1-2.6 cm long, capsules erect to inclined, straight or slightly curved, urns often wrinkled or striate when dry, 1-2.5 mm long.

Habitat: At low or high altitudes in mainly shaded situations, commonly on soil or humus overlying boulders and cliff ledges, occasionally on rotten logs, stumps and bases of trees.

Distribution: Frequent in the East, from southern Greenland and Labrador, south to northern Georgia, west to Ontario, Minnesota, South Dakota, Iowa, Missouri and Arkansas; less frequent in the West from Alaska, Yukon Territory, Northwest Territories (western Mackenzie District), British Columbia, Washington, Oregon and Idaho; disjunct to Colorado; Europe and Asia.

4. Plagiothecium latebricola B.S.G. Figs. 18-23

A rare plant distinguished by its stems to 2 cm long, erect-spreading, mostly symmetric, somewhat concave leaves, 0.7-1.5 mm long, median cells 4-10 µm wide, and tapering leaf decurrencies composed of rectangular cells. Brood bodies are usually present. The plants are dioicous and the sporophytes have setae 0.6-1.0 cm long, erect, mostly straight capsules with smooth urns, 0.5-1.2 mm long.

Habitat: At low altitudes in swamps, bogs, fens and inundated woods on rotten logs, stumps, bases of trees and humus.

Distribution: Rare or seldom collected; known only in eastern North America from Newfoundland, New Brunswick, Nova Scotia, southeastern Ontario, southwestern Quebec, Connecticut, Massachusetts, New York, New Jersey, Michigan and Wisconsin; Europe and Japan.

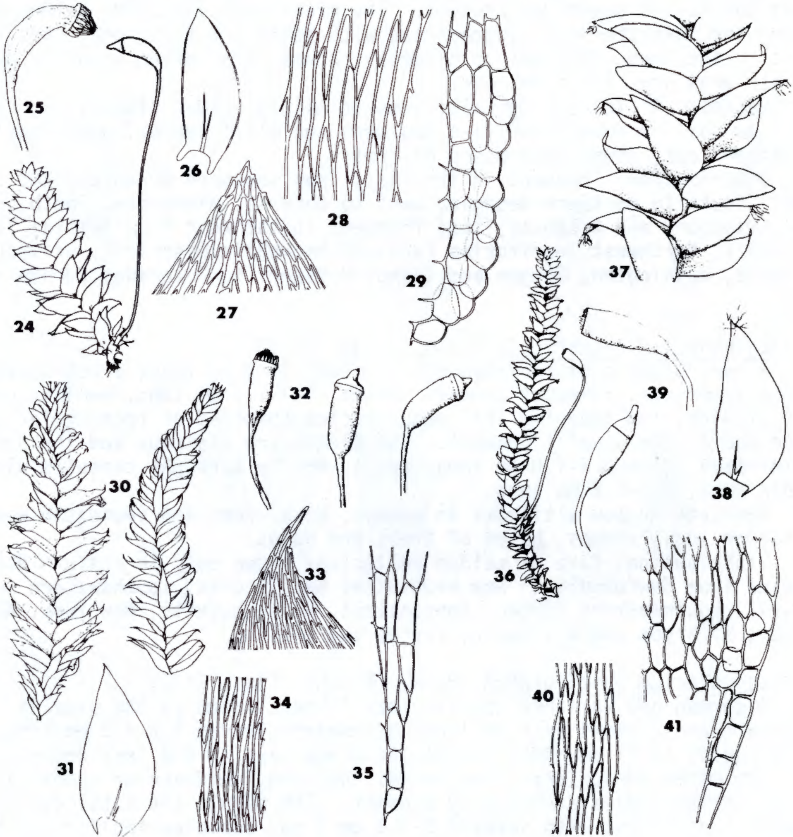
5. Plagiothecium denticulatum (Hedw.) B.S.G. Figs. 24-29

A common and variable species that is best known by the usually complanate plants, stems to 5 cm long, asymmetric leaves 1.5-4.0 mm long, median cells 12-21 µm wide, broadly recurved margins and leaf decurrencies that are often auriculate, composed of inflated, quadrate or spherical cells. Brood bodies are usually present. The plants are autoicous or sometimes dioicous, with setae 1.5-3.5 cm long, capsules inclined to horizontal, slightly curved, urns distinctly striate when dry, 1.5-3.5 mm long.

Habitat: At low altitudes, mainly below 900 m, in woods on rotten logs, stumps, bases of trees, or on humus or soil frequently overlying boulders and cliffs.

Distribution: Greenland and Labrador, south to the mountains of North Carolina and Tennessee, west to Manitoba, Minnesota and Iowa; in the West from Alaska to Yukon Territory, south to central California, Nevada, Arizona and New Mexico; also in a few scattered localities in the continental Northwest Territories and one locality on southern Baffin Island; Europe, Asia, Africa and Australia.

Note: A new species, P. berggrenianum Frisvoll, was recently described and attributed to arctic North America. It is distinguished from P. denticulatum by its julaceous stems that have imbricate, concave, symmetric leaves with acuminate, recurved apices. I have considered somewhat similar plants (e.g., P. sandbergii Ren. & Card. in Holz.) to be environmental forms of P. denticulatum in the past but I prefer to reserve judgement on this species pending further studies.



Figures 24-29. P. denticulatum.--24. Habit, x 3.--25. Capsule (dry), x 6.--26. Leaf, x 8.--27. Apical leaf cells, x112.--28. Median leaf cells, x 112.--29. Decurrent leaf cells, x 112.

Figures 30-35. P. laetum.--30. Habits, x 4.--31. Leaf, x 14.--32. Capsules (dry), x 6.--33. Apical leaf cells, x 112.--34. Median leaf cells, x 112.--35. Decurrent leaf cells, x 112.

Figures 36-41. P. schraderi.--36. Habit, x 1½.--37. Enlargement of stem, x 7.--38. Leaf, x 13.--39. Capsules (wet), x 6.--40. Median leaf cells, x 112.--41. Decurrent leaf cells, x 112.

6. Plagiothecium laetum B.S.G. Figs. 30-35

A common species often confused with the preceding. Plants usually complanate, small, stems to 2 cm long, leaves asymmetric, often slightly undulate, sometimes secund with apices pointing toward substrate, 0.7-2.6 mm long, median cells 4-10 µm wide, margins plane or very narrowly recurved and leaf decurrencies tapering, composed of rectangular cells. Brood bodies commonly present. Autoicous, plants often fruiting, setae 1-1.6 cm long, capsules straight to slightly curved and horizontal, urns smooth or those of curved capsules rarely wrinkled when dry, 0.5-2.0 mm long.

Habitat: At high or low elevations, usually in coniferous woods on rotten logs, stumps, bases of trees, humus or soil, frequently overlying boulders and cliffs.

Distribution: Greenland and Labrador, south to the mountains of North Carolina and Tennessee, west to Manitoba, Minnesota and Iowa; in the West from Alaska to Yukon Territory, south to central California, Idaho, Colorado and New Mexico; also in a few scattered localities in the continental Northwest Territories and one locality on southern Victoria Island; Europe, Asia and New Zealand.

7. Plagiothecium schraderi (C. Müll.) Kindb. Figs. 36-41

Plants complanate, stems to 3 cm long, leaves asymmetric with rhizoids often present at tips, 1.5-2.5 mm long, median cells 9-14 µm wide, margins plane or recurved at base and leaf decurrencies tapering, composed of quadrate to rectangular cells. Autoicous or dioicous, plants often fruiting, setae 1.5-2.0 cm long, capsules erect to inclined, straight, urns smooth, 1-2 mm long.

Habitat: In forests at 1400 m or higher on decaying logs, bases of trees, boulders and cliffs.

Distribution: Southern Mexico (Chiapas, Districto Federal, Jalisco, México, Michoacan, Oaxaca, Veracruz); West Indies, Central and South America.

Buck, W. R. & R. R. Ireland. 1985. A reclassification of the Plagiotheciaceae. Nova Hedwigia 40: in press.

Ireland, R. R. 1969. A taxonomic revision of the genus Plagiothecium for North America, north of Mexico. Natl. Mus. Canad. Publ. Bot. 1: i-viii, 1-118

FOURTH MIDWESTERN BRYOLOGICAL FORAY

Friday, September 20, 1985 through Sunday, September 22, 1985 at Cusino Lake Field Station of Northern Michigan University. For information write: Dr. Maynard Bowers, Department of Biology, Northern Michigan University, Marquette, MI 49855. (906) 227-2443 or 227-2310.

1985 ANDREWS FORAY

Friday, September 20, 1985 through Sunday, September 22, 1985 at the Craftsbury Touring Center in northern Vermont. For information write: Cyrus B. McQueen, Department of Botany, University of Vermont, Burlington, VT 05401.

TWO CRUSTOSE LICHENS NEW TO NORTH AMERICA[1]

Josh Royte
Biology Department
Bard College
Annandale, NY 12504

Lois Brako and Richard C. Harris
New York Botanical Garden
Bronx, NY 10458-9980

Examination of material collected by the first author as part of a Bard College senior project studying the lichen community on a small island in the Hudson River revealed two lichens not previously reported from North America: Acarospora subfuscescens (Nyl.) Magn. and Caloplaca scotoplaca (Nyl.) Magn.

Skillpot or Turtle Island is a small barren island, rising ca. 4 m above sea level, in Tivoli South Bay which is part of the fresh water Hudson River Estuary where tidal variation averages two meters. The rock is Ordovician pelite (mudstone). Gulls and waterfowl often roost on the island resulting in small accumulations of nitrogen-rich guano. The island is often blown free of snow during the winter months except for accumulations in pockets and clefts. These conditions lead to an interesting dominant crustose-foliose lichen community with a few shrubs sheltering mosses and Cladonia apodocarpa Robbins and C. rei Schaerer. It is noteworthy that both Acarospora subfuscescens and Caloplaca scotoplaca in Europe are thought to prefer sites high in nitrogen. This may mean that their North American distribution is relatively restricted and explain why they have escaped notice previously, thus emphasizing the importance of local studies such as this.

Acarospora subfuscescens is easily recognized by its small Sarcogyne-like apothecia with the upper parts of the exciple black, a rare character in Acarospora. The thallus is brown, C-, areolate or more or less continuous with a whitish, weakly raised margin. It is otherwise known from central Europe.

Caloplaca scotoplaca is a member of the Caloplaca ferruginea group characterized by a well developed gray thallus, crowded rusty orange apothecia having a lighter margin, and narrow spores (under 8 μm) with a narrow isthmus, which is quite variable, mostly narrower than reported for Europe, ranging from 2-4 μm. The apothecia are essentially lecideine but are often immersed in the thallus and may appear lecanorine. Both the thallus and apothecial disk vary in color even within the limited collecting area: the tallus from almost white to blackish and the apothecia from rust-brown to pale orange. Caloplaca scotoplaca is a European species which may have been reported previously from North America as C. caesiorufa auct., a name which has largely been abandoned by European authors, but we have not investigated further.

Vouchers are deposited in the herbarium of Bard College and NY.

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[1] Bard College Field Station Contribution no. 41

ORTHOTRICHUM OBTUSIFOLIUM AND TORTULA PAPILLOSA IN WESTERN NEW YORK STATE

P. M. Eckel
Clinton Herbarium
Buffalo Museum of Science
Buffalo, NY 14211

Ketchledge's checklist of the mosses of New York State was first issued in 1957, with a second, expanded edition in 1980. The following is a report of Orthotrichum obtusifolium Brid. and Tortula papillosa Wils. ex Spruce, which are new to the eight western New York counties according to this publication.

This report of Orthotrichum obtusifolium was initially based on a collection I made in Wyoming County. Additional records were noted from collections already at BUF made by Ann Glowny, an amateur bryologist actively associated with the herbarium until 1975, and by Richard Zander, current curator at BUF. The distribution map (Fig. 1) displays the distribution of O. obtusifolium in western New York from collections at BUF, and supports the generalization that this species is common in rather northern temperate regions of the United States and Canada.

The following specimens are in BUF:

Orthotrichum obtusifolium Brid.--U.S.A.: New York: Cattaraugus Co.: Dayton Twp., village of South Dayton, trunk of maple, 13 Oct 1975, *Zander 4310;* Red House Twp., on Park Rt. 1, Allegany State Park, Stone Tower, 1 mi N of Red House Lake, 2202 ft elev., on lee side of tower, vertical wall, some reaction with HCl, 22 Sep 1984, *Eckel 192284e*. Chautauqua Co.: Cherry Creek Twp.; town of Cherry Creek, trunk of Acer saccharum, 16 Jul 1972, *Zander s.n.* Erie Co.: City of Buffalo, Delaware Park, on vertical stone wall, lakeside, 7 Feb 1976, *Zander 4294*. Genesee Co.: Byron Twp., Byron, hedgerow by Hessenthaler Rd., near Swamp Rd., on weathered, falling, zig-zag rail fence, 2 Apr 1968, *Glowny s.n.;* Darien Twp., woods on Alley Rd. in southwesternmost corner of the county, on branches from crotch of large dead tree (oak?), 19 Mar 1969, *Glowny s.n.;* Alabama Twp., Iroquois National Wildlife Refuge, "Swallow Hollow" in the Alabama Swamps, on bark of dead hardwood tree, in swamp, N-facing, 15 Mar 1984, *Eckel IWS84*.

Two additional reports for this taxon were made by Randall (1973) for Wyoming County on the Genesee River.

Tortula papillosa Wils. ex Spruce--U.S.A.: New York: Cattaraugus Co.: Red House Twp., on Park Rt. 1, Allegany State Park, Stone Tower, 1 mi N of Red House Lake, 2202 ft elev., on lee side of tower, vertical wall, some reaction with HCl, 22 Sep 1984, *Eckel 192284n*.

Randall (1973) and Ketchledge (1980) report only two other Tortula species from western New York: T. ruralis and T. mucronifolia.

Although this species generally frequents the bases of trees, this report from southwestern New York State is from the mortared wall of a stone tower. Ketchledge (1980) reports T. papillosa as occurring in the southeastern portion of the state. Its presence at this site may be related to the fact that this area is part of the unglaciated region of the state and may indicate a naturally disjunctive relationship between two bryophyte floras as they occur in the southern part of the state, as distinct from an artificial disjunction due to absence of collecting activity.

Steere (1939) suggested this species is "apparently most common in the northeastern states" in terms of abundance, but its known range has been extended throughout southern latitudes in the United States, into Mexico, Columbia, Equador, etc. (Crum & Anderson 1981), since publication of the Grout flora.

Mosses growing in association with Tortula papillosa at this station were: Orthotrichum obtusifolium, O. anomalum, Amblystegium varium, Bryum argenteum, B. capillare var. flaccidum, B. lisae var. cuspidatum, Ceratodon purpureus, Grimmia apócarpa var. apocarpa, Brachythecium salebrosum, Leskea polycarpa, Entodon seductrix and Platygyrium repens. The number of propaguliferous species occurring in this association on the vertical face of the wall is noteworthy, as is the number of species, all representing populations of limited wall area. All propaguliferous species were richly covered with diaspores, Ceratodon purpureus was currently producing archegonia and antheridia, and had capsules of a previous season, as did Bryum argenteum and B. lisae var. cuspidatum, Grimmia apocarpa and Platygyrium repens. Such an apparently exposed situation supported a surprisingly high species diversity, perhaps due to exposure to wind-dispersed diaspores, and brought forth consistent demonstrations of reproductive activity, perhaps due to a regime of stressful environmental conditions.

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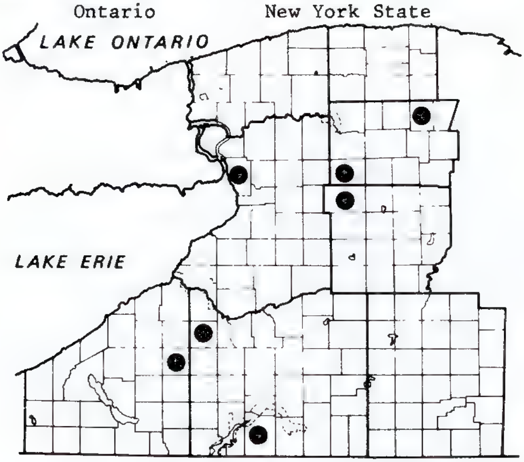

Figure 1: The distribution of Orthotrichum obtusifolium Brid. in western New York State corresponding with specimens in the Clinton Herbarium (BUF).

SPHAGNACEAE OF VERMONT

Cyrus B. McQueen
Department of Botany
The University of Vermont
Burlington, VT 05405

The Sphagna of Vermont have received little attention. Grout (1898) reported 10 species, Andrews (1906) reported 15 species, and in a revision of his earlier list Grout (1932) reported 21 species. Recent investigations based on examination of herbarium specimens and field studies have revealed that there are 29 species of Sphagnum in Vermont. Sphagnum tenellum and S. torreyanum were reported by Grout (1932), but neither species was found in the localities cited by Grout and no herbarium vouchers could be located. Sphagnum tenellum may yet be collected in Vermont since it is known from the Adirondack Mountains of New York; however, the report of S. torreyanum is probably based on a misdetermination since this species is primarily a coastal plain one (Andrus 1980). Although S. pylaesii and S. lindbergii are found in the higher elevations of the mountains of New York and New Hampshire, neither species has yet been found in the Green Mountains of Vermont in spite of a concerted effort on my part to locate them. In general the species found in Vermont are typical for continental northeastern North America (Andrus 1980).

The nomenclature conforms to Andrus (1980) except for S. nemoreum Scop. and S. rubellum Wils. which I regard as synonyms of S. capillifolium.

S. angustifolium (Russow) C. Jens.--Addison Co.: *Dutton 178, 269* (F), *270* (VT); *Pringle 368* (VT). Chittenden Co.: *Flynn 1911* (VT). Lamoille Co.: *McQueen 381, 1006* (VT); *Dutton 1437* (VT).

S. capillifolium (Ehrh.) Hedw.--Addison Co.: *Zeke 8074* (VT); *Pringle 1880* (F); *Dutton 129* (BH). Bennington Co.: *Zeke 8041, 8050* (VT). Caledonia Co.: *McQueen 506, 684* (VT). Chittenden Co.: *Stone 3a* (VT). Franklin Co.: *McQueen 765* (VT). Lamoille Co.: *McQueen 254, 467, 1063* (VT); *Carpenter 1936* (VT); *Stone 27* (VT). Orleans Co.: *Winslow 85* (BH). Rutland Co.: *Dutton 223, 468* (BH); *Zeke 7991* (VT). Windham Co.: *Zeke 8056A* (VT). Windsor Co.: *Kitridge 1921* (BH, F).

S. centrale C. Jens.--Addison Co.: *Dutton 1422, 204* (CU, VT). Bennington Co.: *Zeke 8038* (VT). Chittenden Co.: *Stone 5* (VT). Lamoille Co.: *McQueen 393, 454, 1050* (VT). Orange Co.: *Miller 1145* (CU). Rutland Co.: *Dutton 146, 441* (VT), *183* (CU); *Zeke 7990* (VT). Windsor Co.: *Dutton 204* (CU, VT).

S. compactum DC.--Windham Co.: *Wicks 329* (WVA); *Grout 1937* (BH, F, NY, VT, WVA).

S. contortum K. F. Schultz--Rutland Co.: *Dutton 1475* (VT).

S. cuspidatum Hoffm.--Bennington Co.: *Grout 1894* (BH). Caledonia Co.: *McQueen 678* (VT). Lamoille Co.: *McQueen 378, 1071* (VT).

S. fallax (Klinggr.) Klinggr.--Bennington Co.: *Zeke 8051* (VT). Caledonia Co.: *McQueen 1385* (VT). Lamoille Co.: *McQueen 405, 1001* (VT). Rutland Co.: *Zeke 7989* (VT).

S. fimbriatum Wils.--Bennington Co.: *Dole 371* (VT); *Carpenter 1939* (VT). Chittenden Co.: *Stone 16* (VT). Lamoille Co.: *McQueen 388, 458, 784* (VT).

S. flexuosum Dozy & Molk.--Caledonia Co.: *McQueen 510* (VT). Lamoille Co.: *McQueen 382* (VT). Rutland Co.: *Dutton 182, 282* (BH, VT).

S. fuscum (Schimp.) Klinggr.--Addison Co.: *Pringle 199, 414, 365* (VT); *Jones 1880* (VT). Bennington Co.: *Zeke 8035* (VT). Caledonia Co.: *McQueen 651* (VT). Chittenden Co.: *Balch 1076* (VT). Franklin Co.: *Grout 1896* (VT). Lamoille Co.: *McQueen 377, 469, 1062* (VT). Windham Co.: *Dobbin 1909* (BH, NY, VT).

S. girgensohnii Russow--Addison Co.: *Dutton 130, 135, 152, 203, 946* (CU, F, NY, VT). Bennington Co.: *Zeke 8049* (VT). Caledonia Co.: *McQueen 687* (VT). Chittenden Co.: *Kirk 951* (VT); *Dutton 1441* (CU); *Rooks 76-22* (VT); *Pringle 381* (VT). Lamoille Co.: *McQueen 397* (VT). Rutland Co.: *Dutton 464, 888* (CU, VT); *Kirk 1995* (CU). Washington Co.: *Rooks 79-9* (VT).

S. henryense Warnst.--Chittenden Co.: *Stone 6a* (VT); *Jones 1908* (VT).

S. imbricatum Russow--Chittenden Co.: *Flynn 1913* (VT). Windham Co.: *Flynn 1913* (VT).

S. lescurii Sull.--Lamoille Co.: *McQueen 83* (VT). Rutland Co.: *Dutton 180, 844* (VT).

S. magellanicum Brid.--Addison Co.: *Ruth 33* (BH); *Flynn 1898* (VT); *Dutton 133, 247, 368, 1994* (BH, VT). Bennington Co.: *Zeke 8052* (VT). Caledonia Co.: *McQueen 513, 657* (VT); *Faxon 30, 32* (BH). Chittenden Co.: *Stone 1a* (VT). Franklin Co.: *McQueen 757* (VT). Lamoille Co.: *McQueen 380, 456, 1008* (VT). Rutland Co.: *Dutton 183, 368, 1994* (BH, VT). Windham Co.: *Dobbin 1909* (BH, VT).

S. majus (Russow) C. Jens.--Caledonia Co.: *McQueen 1158* (VT). Lamoille Co.: *McQueen 382, 1059* (VT).

S. palustre L.--Addison Co.: *Dutton 149, 2230, 2497* (BH); *Pringle M287, 366* (VT); *McQueen 520* (VT); *Bliss 1918* (F). Bennington Co.: *Zeke 8048* (VT). Chittenden Co.: *Pringle 1880* (VT); *Grout 1896* (VT); *Hood 1903* (VT); *Zeke 7979* (VT). Rutland Co.: *Dutton 146* (BH). Windsor Co.: *Dutton 280* (F, VT).

S. papillosum Lindb.--Chittenden Co.: *Dutton 955* (BH, VT). Rutland Co.: *Dutton 441* (VT). Windham Co.: *Collins 15625* (BH, WVA).

S. quinquefarium (Braithw.) Warnst.--Lamoille Co.: *McQueen 1129* (VT). Orleans Co.: *Faxon 38, 42* (BH, CU); *McQueen 1467* (VT). Rutland Co.: *Dutton 1397* (BH, CU). Windham Co.: *Grout 1911, 1937* (BH, NY); *Zeke 7981* (VT).

S. recurvum P.-Beauv.--Addison Co.: *Dutton 178* (F, CU, VT). Caledonia Co.: *McQueen 516, 659* (VT). Chittenden Co.: *Dutton 951, 1437* (BH). Lamoille Co.: *McQueen 378, 455* (VT). Rutland Co.: *Dutton 182* (VT).

S. riparium Ångstr.--Lamoille Co.: *Wilmont 83* (VT).

S. russowii Warnst.--Addison Co.: *Dutton 34, 188* (BH, CU, VT). Bennington Co.: *Zeke 8042* (VT). Caledonia Co.: *Eaton & Faxon 22* (BH, CU, VT); *McQueen 1111* (VT). Chittenden Co.: *Zomlefer* (VT); *Kirk 953* (VT); *Jones 1905* (VT); *Flynn 1911* (VT). Franklin Co.: *McQueen 821* (VT). Lamoille Co.: *McQueen 1168* (VT). Orleans Co.: *Rooks 76-35* (VT). Rutland Co.: *Dutton 223* (VT). Washington Co.: *Carpenter 1933* (VT). Windham Co.: *Zeke 8056B* (VT).

S. squarrosum Crome--Addison Co.: *Dutton 43, 151, 823* (CU, F, VT). Bennington Co.: *Dobbin 1907* (CU). Caledonia Co.: *Bliss 1920* (F). Chittenden Co.: *Dutton 952* (CU, VT); *Jones 1905* (VT). Essex Co.: *Dole 1941* (VT). Franklin Co.: *McQueen 828* (VT). Lamoille Co.: *Grout M293* (VT); *Howard 1974* (VT). Rutland Co.: *Carpenter 1935* (VT). Windham Co.: *Grout 1900* (BH, WVA); *Dobbin 1909* (CU, VT); *Habeeb 455* (F).

S. subfulvum Sjörs--Chittenden Co.: *Stone 9* (VT). Lamoille Co.: *Pringle 325* (VT). Rutland Co.: *Dutton 1397* (VT).

S. subsecundum Nees--Franklin Co.: *McQueen 758* (VT). Orange Co.: *Miller 1149* (BH). Rutland Co.: *Kirkland 1910* (BH, VT); *Dutton 1475* (BH, CU, F, VT). Windham Co.: *Grout 402* (F).

S. subtile (Russow) Warnst.--Addison Co.: *Dutton 34, 132, 251* (BH, F, VT). Caledonia Co.: *McQueen 1325* (VT). Chittenden Co.: *Jones 1905* (VT). Lamoille Co.: *Smith 1936* (VT); *McQueen 1339* (VT).

S. teres (Schimp.) Ångstr.--Addison Co.: *Dutton 173, 1909* (BH, F, VT). Franklin Co.: *McQueen 791* (VT). Lamoille Co.: *McQueen 230, 232, 236* (VT).

Orange Co.; *Miller 1148* (BH). Rutland Co.; *Dutton 1474* (BH, F, VT). Windsor Co.; *Dutton 289* (BH, VT).

S. warnstorfii Russow--Addison Co.; *Dutton 118, 131* (CU, VT). Bennington Co.: *Andrews 1921* (BH, VT). Caledonia Co.; *McQueen 1394* (VT); *Faxon 1894* (BH, VT, WVA). Chittenden Co.; *Flynn 1910* (VT); *Stone 11* (VT). Orange Co.: *Dutton 1147* (BH); *Miller 1304* (BH). Orleans Co.: *Faxon 1893* (BH, VT, WVA). Rutland Co.: *Dutton 1448* (CU, F, VT). Windham Co.: *Dobbin 1909* (BH, VT). Windsor Co.: *Kittridge 1921* (VT).

S. wulfianum Girg.--Addison Co.: *Dutton 134* (BH, F, VT, WVA), *945* (BH, CU), *661* (BH). Caledonia Co.: *McQueen 704* (VT). Lamoille Co.: *McQueen 1368* (VT).

The assistance of the herbarium curators at BH, CU, F, NY, VT and WVA is gratefully acknowledged.

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A TECHNIQUE FOR RAISING AND MAINTAINING CULTURES OF SPHAGNUM FROM SPORES

Cyrus B. McQueen
Department of Botany
The University of Vermont
Burlington, VT 05405

During the course of developmental studies a simple technique was devised for raising cultures of Sphagnum from spores. The technique has research and educational applications because it is inexpensive, easy to set up and maintain, and reliable. In this paper I will outline the collection and storage of spores, the set up, and the maintenance of the cultures.

Sporophytes may be collected throughout the summer. In New England I have observed that there is a general pattern of sporophyte maturation among some common species. Four species that produce mature sporophytes in late spring and early summer are S. fimbriatum, S. magellanicum, S. fallax and S. squarrosum. Many common open bog species such as S. fuscum, S. nemoreum, S. rubellum and S. angustifolium produce mature sporophytes by midsummer. Many shade tolerant species such as S. subtile, S. centrale, S. girgensohnii and S. russowii produce mature sporophytes during the latter portion of the summer. Sporophytes may be collected and stored in either paper envelopes or glass vials. If stored in glass vials, the sporophytes should be allowed to dry out before sealing the vial. Ruptured capsules often contain many spores and should also be collected. I have stored spores for over seven months in stoppered vials at room temperature and still find that many germinate.

The set up for the cultures is relatively simple. Small plastic petri dishes (60 × 15 mm) are filled halfway with sterilized commercial peat.

The peat may be sterilized by pouring boiling water over it, using cheesecloth as a filter. Distilled water is added until the peat is barely submerged. Single intact capsules may be ruptured and placed in the petri dish or spores from ruptured capsules may be dusted on the dish using a brush. The petri dishes should be covered to minimize evaporation and contamination.

The time of germination depends on the light conditions. Germination occurs rapidly if the cultures are subjected to 18 hours of light per day using fluorescent lights at 20°C. Under these conditions I have observed germinating spores of S. fuscum within two days and the remaining species mentioned above within three to four days. The cultures may also be placed in well-lighted windows, but germination is slower. Cultures placed in a south-facing window germinated after one week.

Growth of the protonema is rapid. Small thalloid protonemata may be observed as soon as two weeks after germination. Within one month buds develop and small plants may be observed. After two months branch fascicles may be observed. The only care needed to maintain the cultures is to water them once a week. The covers of the petri dishes should be replaced with small inverted transparent plastic glasses to accommodate the growing plants. Germinating spores and protonemata in various stages of development may be observed even several months after the establishment of a culture.

Development of the mature plants is affected by the amount of standing water in the dishes. Plants will not produce branches as long as they are submerged, whereas fascicles will develop on larger plants growing above the water level.

This technique has obvious advantages over other sterile techniques. I have not had any trouble with fungal contamination even after repeatedly sampling the cultures. As a precaution I usually surface sterilize forceps by flaming or by dipping the forceps in 95% ethyl alcohol. The spores from a single capsule will produce enough plants to fill the entire petri dish and provide ample numbers of plants for further subcultures. Individual plants or groups of plants may be transferred to new petri dishes easily.

The educational value of this technique is great. Students can set up inexpensive cultures easily and observe the development of protonemata in a short time period. Cultures could also be used in many different experimental situations in beginning as well as advanced botany courses. Other bryophytes could perhaps be cultured using this technique.

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MACROSCOPIC KEY TO THE SPHAGNACEAE OF THE NORTHEASTERN UNITED STATES

Cyrus B. McQueen
Department of Botany
The University of Vermont
Burlington, VT 05401

Although the genus _Sphagnum_ is easily recognized, species determinations are often considered difficult. The recent treatments of _Sphagnum_ by Andrus (1980), Crum and Anderson (1981), Ireland (1982) and Crum (1984) have made it possible to identify species throughout North America. It is apparent from these treatments and from my own field experience that a major portion of the species can be identified in the field with only a hand-lens. The following key was constructed for use in the field with a hand-lens and a few other pieces of equipment. A hand-lens of 15× to 20× is necessary. An optional field microscope may be made by fastening a discarded microscope objective and ocular together with electrical tape. Tweezers are useful for removing individual fascicles of branches for examination and a small metric ruler is useful for making measurements. To examine stem leaves, which are necessary for most species determinations, the capitulum is plucked off and the fascicles of branches are carefully removed. A permanent marking pen may be used to stain the leaves to make them stand out.

Although the key is intended for the northeastern United States, it can be used in a much broader area since the majority of the species are more widespread. The nomenclature follows Andrus (1980). It is important to verify field identifications with microscopic characters because many species are easily modified by the environment and one species may take on the macroscopic appearance of another, although they may be separated on the basis of microscopic characters. I have not been able to verify this key for every species in the field and thus parts of the key are based on herbarium specimens. Some species, especially in sections _Sphagnum_ and _Subsecunda_, are difficult to separate even using microscopic characters so that some failures in field identification should be expected. For these reasons, I would appreciate negative as well as positive comments on the usefulness of this key in the field.

MACROSCOPIC KEY TO SECTIONS OF SPHAGNUM IN THE NE UNITED STATES

1. Branch leaves cucullate
   2. Stem leaves small and triangular, < 1 mm long; branch leaves somewhat squarrose.. _Rigida_
   2. Stem leaves large, > 1 mm long, ligulate or fan-shaped; branch leaves tightly or loosely imbricate................. _Sphagnum_
1. Branch leaf margins inrolled or flat, but not cucullate
   3. Six or more branches per fascicle.. _Polyclada_(monotypic:_S. wulfianum_)
   3. Five or fewer branches per fascicle
      4. Branch leaves squarrose
         5. Stem leaves small and triangular, < 1 mm long........... _Rigida_
         5. Stem leaves large and ligulate, 1-1.5 mm long........ _Squarrosa_
      4. Branch leaves not squarrose
         6. Extremely long non-undulate tufted branch leaves; plants dark brown, greenish or silvery; primarily coastal plants..... .... _Isocladus_(monotypic:_S. macrophyllum_)
         6. Coastal or continental plants with undulate or non-undulate branch leaves; plants various colors
            7. Hanging and spreading branches very similar, flexuose, about the same length, or plants unbranched...... _Subsecunda_

7. Hanging branches usually longer and more slender than spreading branches, the distinction between hanging and spreading branches pronounced

  8. Stem leaves much smaller than branch leaves; plants various shades of green, yellow or brown, never red but sometimes branches and stems pinkish; on plants with five-parted capitula, paired branches of fascicles present between rays of branches; plants of wet mineral rich depressions, submerged or near the water level. *Cuspidata*

  8. Stem leaves nearly the same size as branch leaves or larger; plants various shades of green, brown or red; on plants with five-parted capitula, branches of fascicles single or absent between rays of branches; plants of drier mineral poor acid habitats, not normally submerged, usually growing above water level.................... *Acutifolia*

SECTION ACUTIFOLIA

1. Many fascicles with three spreading and two hanging branches............ .... *S. quinquefarium*

1. Two spreading branches and one or two hanging branches per fascicle

  2. Stem leaves fan-shaped or lingulate and fringed at least at apex

    3. Stem leaves fan-shaped and fringed from apex down sides nearly to base; terminal bud large; often fruiting......... *S. fimbriatum*

    3. Stem leaves lingulate and fringed only at apex or with distinct notch; terminal bud lacking or poorly developed; seldom fruiting

      4. Stem leaves fringed across apex; plants stiff and wiry with long slender spreading branches perpendicular to to stem; plants green, never red.............. *S. girgensohnii*

      4. Stem leaves with distinct notch at apex; plants not especially wiry or stiff; plants green, but usually splotched with red................................ *S. russowii*

  2. Stem leaves variously shaped, margins entire, never fimbriate, with rounded or pointed apex

    5. Capitulum flat, five-parted; branch leaves in five rows

      6. Plants of *Thuja*, *Abies* and/or *Picea* swamps and rich minerotropic fens; slender spreading branches with leaves in five distinct rows, leaves straight, not curved; stem leaves short, 1.5:1 or less, lingulate or triangular with apex usually rounded, sometimes pointed; plants green, but usually purplish-red tinged, rarely red throughout.................. *S. warnstorfii*

      6. Plants of open bogs, common hummock formers; branch leaves usually in five rows, leaves usually curved to one side; stem leaves long lingulate, 1.5:1 or longer, with rounded or pointed apex; plants green, but usually red throughout or splotched red-green...... *S. rubellum*

    5. Capitulum flat, rounded or hemispherical, not five-parted; branch leaves not in five rows

      7. Plants greenish-brown, yellow-brown, brown or deep red-brown

        8. Stem leaves lingulate with broad rounded apex; hummock former in dry open acid bogs..................... *S. fuscum*

        8. Stem leaves lingulate-triangular, apex not rounded; forms mats or small hummocks in wet minerotrophic habitats

9. Plants large and stiff to touch; stem leaf length to width ratio 1.5:1 or greater; stem leaf apex apiculate or right-angled; branches mostly 1 mm wide or greater; usually in coastal hatitats.. *S. flavicomans*

9. Plants moderate sized and soft to touch; stem leaf length to width ratio less than 1.5:1; stem leaves with obtusely angled apex; hummock former in shrubby or wooded fens..................... *S. subfulvum*

7. Plants not greenish-brown, brown or red-brown

10. Stem leaves short, less than 1.5:1, triangular; forms hummocks in damp coniferous forests and hardwood swamps.................................. *S. subtile*

10. Stem leaves long, greater than 1.5:1, lingulate, ovate, not triangular; plants of open bog habitats

11. Stem leaves broadest at base

12. Stem leaf margins near apex strongly inrolled, apex toothed, stem leaves greater than 1.5 mm long; branches with swollen appearance; plants of coastal areas on damp sand or on pond margins................................. *S. tenerum*

12. Stem leaf margins not strongly inrolled, apex not strongly toothed, stem leaves less than 1.5 mm long; branches not appearing swollen; hummock former in open and treed acid bogs... *S. nemoreum*

11. Stem leaves broadest above middle

13. Stem leaf with truncate, dentate apex; branch leaves not strongly inrolled at apex, 6-10 teeth at apex; plants soft and lax; capitulum with large blunt, flat branches; plants usually pale green or purple-red........... *S. angermanicum*

13. Stem leaf with broad, toothed apex; branch leaves with inrolled margins, apex with up to 8 large teeth; plants stiff when dry; capitulum large and compact with round, pointed branches; plants pale white, yellow or purple, rarely deep colored............................ *S. molle*

SECTION CUSPIDATA

1. Stem leaves large, 1-1.5 mm long, apex irregularly cut or torn

2. Stem leaves fan-shaped or aquarish, broad apex cut or torn with coarse teeth; branch leaves in five rows; stem dark brown... *S. lindbergii*

2. Stem leaves broad triangular, not fan-shaped; stem leaves torn down the middle; branch leaves usually not in five rows; plants pale green or yellow, rarely dark brown.......... *S. riparium*

1. Stem leaves large or small, apex not irregularly cut or torn

3. Stem and branch leaves almost the same size and shape; stem leaves lingulate; branch leaves strongly concave, not inrolled at apex, not undulate, not recurved.................... *S. tenellum*

3. Stem and branch leaves distinctly different in size and shape

4. Stem leaf apex truncate or broadly rounded, 0.8 mm or longer

5. Branch leaves in five rows; hanging and spreading branches and leaves similar, hanging branches loosely covering the stem, branch leaves long and narrow, recurved at tips when dry; capitulum five-parted........................ *S. recurvum*

5. Branch leaves not in five rows; hanging and spreading branches different with hanging branches tightly covering the stem, branch leaves ovate to broadly ovate-lanceolate; the capitulum resembles a small, loose ball of yarn........... .... *S. flexuosum*

4. Stem leaf apex acute, apiculate, or rounded, but not truncate, 0.5 mm or longer
   6. Apex of stem leaf apiculate
      7. Branches short and thick with broad apiculate leaves, branch leaves in five rows; spreading and hanging branch leaves different; plants green, yellow, and brown.. *S. pulchrum*
      7. Spreading and hanging branches slender, branch leaves not in five rows; spreading and hanging branch leaves similar; plants green, yellow, seldom brown....... *S. fallax*
   6. Stem leaves with acute or rounded apex, not apiculate
      8. Stem leaves small, < 0.8 mm long; plants usually above water level in acid bogs and poor fens..... *S. angustifolium*
      8. Stem leaves longer than 0.8 mm; plants primarily aquatic or found in very wet, mineral-rich habitats
         9. Stem leaves with rounded apex
            10. Plants brownish-green, almost black; branch leaves usually in five rows and are strongly curved and turned to one side at branch tips; weakly minerotrophic, aquatic or near water level in wet depressions................... *S. majus*
            10. Plants orange-brown, yellow-brown; branch leaves not in five rows, leaves curved at branch tips, but not all turned in the same direction; minerotrophic and aquatic..... *S. jensenii*
         9. Stem leaves with acute apex
            11. Branch leaves long, slender and inrolled only near apex; branch leaves not in five rows; teeth on branch leaf margin near apex; plants are plumose; growing primarily in coastal regions....... .... *S. trinitense*
            11. Branch leaves long, slender and inrolled at least half the length of the leaf; branch leaves usually in five rows; branch leaf margins without teeth; plants not plumose; near coast and/or inland
                12. Branch leaves inrolled from middle to apex, narrow, often 1 mm wide; sides of triangular stem leaves longer than base; plants slender, weak and floppy; capitulum not noticeable; plants green or yellow, bases of branches in capitulum may be red-tinged........ *S. cuspidatum*
                12. Branch leaves inrolled from near base to apex, usually less than 0.8 mm wide; base and sides of triangular stem leaves are almost equal in length; plants large; capitulum noticeable; plants green, yellow or brown...... *S. torreyanum*

SECTION ISOCLADUS

Extremely long, nonundulate, tufted branch leaves; plants dark brown, greenish, or silvery; primarily coastal plants; could be confused with dark aquatic forms of *S. torreyanum* but its branch leaves not as tufted... *S. macrophyllum*

SECTION POLYCLADA

Six or more branches per fascicle; branch leaves in five rows; hemispherical capitulum; thick stems sometimes dark brown to black; large plants forming loose carpets on damp humus in mineral poor, coniferous swamps and fens.................................. *S. wulfianum*

SECTION RIGIDA

1. Stem leaves of two types, either triangular with short slit down middle at apex or oval shaped with rounded apex; branch leaves with rounded apex, margins inrolled; stem brown, plants pale brownish green, sometimes tinged with violet........ *S. compactum*

1. Stem leaves triangular with broadly rounded apex, almost truncate; branch leaves elongated, leaves abruptly inrolled above middle to form long, tubular apex; stem pale green, plants whitish green.................................... *S. strictum*

SECTION SPHAGNUM

1. Stem leaves long rectangular; plants pink and/or purple-red in open areas and green in shaded areas.............. *S. magellanicum*

1. Stem leaves not long rectangular; plants green, yellow, brown, but not red

    2. Stem leaves fan-shaped, greatly expanded below apex; 2-3 spreading branches and 3 hanging branches; plants green, gold-brown, purple-brown; forming dense carpets in wet forests... *S. centrale*

    2. Stem leaves oval-shaped, leaves widest at middle

        3. Branches, especially in the capitulum, slenderly club-shaped; growing submerged or near water level in shallow, sandy-bottomed ponds; plants green, brown, or gold-brown; coastal habitats................ *S. portoricense*

        3. Branches not club-shaped; plants usually not growing submerged; not strictly coastal

            4. Capitulum small and distinctly flattened with small, pointed branches; plants green, reddish-brown seen in capitulum; newest branches of capitulum noticeably shorter than branches below.................... *S. henryense*

            4. Capitulum large and rounded; plants green, brown, purple-brown; newest branches not noticeably shorter than older branches

                5. Stem leaves > 1.5 mm long and length is almost twice the width; plants green to gold-brown; growing on margins of mineral rich habitats, rarely dominant.................................... *S. palustre*

                5. Stem leaves < 1.5 mm long, only slightly longer than broad

                    6. Stem leaf margins entire, sides nearly parallel; branches spreading, short, thick, and blunt; plants gold-brown to purple-brown, rarely green; found on wet carpets in open areas, sometimes on rocks in mountains, but rarely found in forests...... .... *S. papillosum*

                    6. Stem leaf margins slightly ragged above middle, apex very broadly rounded, stem leaf almost fan-shaped, widest in middle; branch leaves frequently squarrose; plants slender overall; plants green, tinged brown or purple-brown; when growing intermixed with other species of this section, this species is paler...... *S. imbricatum*

SECTION SQUARROSA

1. Branch leaves strongly squarrose throughout plant; stem leaves long triangular with truncate apex; pale green, rarely dark brown.. S. squarrosum
1. Branch leaves imbricate in upper portion of plant and slightly squarrose in lower portion; stem leaves tongue-shaped with rounded or flat apex, apex may have 3-4 low, broad teeth; plants brown in open areas, pale green in shaded areas....... S. teres

SECTION SUBSECUNDA

1. Plants slender, unbranched, capitulum absent............. S. pylaesii
1. Plants large, usually branched, capitulum present
   2. Stem leaves 0.5-1.0 mm long; branch leaves slightly curved to one side
      3. Stem leaves only slightly longer than broad, with broad apex, margin flat; branch leaves not much longer than stem leaves, margins inrolled nearly entire length, leaves slightly curved to one side; small, slender, wiry plants; capitulum usually without a terminal bud; stem dark brown.................................. S. subsecundum
      3. Stem leaves nearly twice as long as broad, slightly rounded at apex, nearly acute, margins flat or inrolled; branch leaves nearly twice the length of the stem leaves, inrolled only near the apex, slightly curved to one side; capitulum large, flat, terminal bud present; stem pale green to light brown......................... S. contortum
   2. Stem leaves longer than 1.0 mm; branch leaves rarely curved to one side
      4. Terminal bud large; 1-3 branches per fascicle, 2 spreading and 1 hanging, little or no difference between hanging and spreading branches, branches do not conceal stem; stem and branch leaves of similar size, shape and structure........... .... S. platyphyllum
      4. Terminal bud indistinct; 4-5 branches per fascicle, 2-3 spreading and 2 hanging, branches noticeably different, hanging branches conceal stem; stem and branch leaves noticeably different in size, shape and structure... S. lescurii

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ANNOUNCEMENTS

John W. Thomson's American Arctic Lichens 1. The Macrolichens was awarded the 1985 Henry Allan Gleason Award of the New York Botanical Garden. The award is made annually at the AIBS meetings for an outstanding recent publication in the field of plant taxonomy, plant ecology or plant geography.

Also at the AIBS meetings in Gainesville, Bruce H. Allen was awarded the first annual A. J. Sharp award for the best student paper presented at the annual meetings. Bruce Allen presented his "Revision of the Dicnemonaceae," based on his Ph.D. research.

STERILE, YELLOWISH LICHEN CRUSTS ON SOIL IN NORTH AMERICA

Bruce McCune
Holcomb Research Institute
Butler University
Indianapolis, IN 46208

Sterile crustose lichens are ignored by keys in most taxonomic works, but ecological or floristic studies often require their identification. Useful treatments of sterile crustose lichens on soil in Great Britain are available (Duncan, 1970; Laundon, 1961), but comparable keys are not available for North America.

The working key given here is a small contribution toward filling this gap. It is hoped that others will use _Evansia_ to share their working keys to groups of sterile species.

Sterile crustose lichens are perhaps best treated at the regional level. However, the present key was developed for a relatively broad area, western and northern North America, because of the small number of species involved.

The key below draws on the literature and personal collections. Primary literature sources were general works (Duncan, 1970; Harris, 1977; Laundon, 1961; Thomson, 1979) and discussions of particular species (_Arthroraphis_: Poelt, 1969; _Caloplaca tominii_: Nimis, 1981 and Thomson, 1982; _Chrysothrix_: Laundon, 1981; _Fulgensia_: Poelt, 1965; _Lecanora reagens_: Hansen, 1983).

KEY TO SPECIES

1. Thallus K+ cinnamon-brown or K+ purple, sorediate or esorediate
    2. Thallus K+ cinnamon-brown or orange-brown, dispersed to almost continuous, consisting of yolk-yellow, heaped or branched granules, which sometimes develop into deeply concave soralia up to 1 mm broad and concolorous with the thallus; lobes very short, rounded and lifting from the substrate; on soil, mosses, and acid rocks; known in North America from the Rocky Mountains and the arctic; in Montana and Idaho found at 1100-1700 m... _Lecanora reagens_ Norm.
    2. Thallus yellow to yellow-orange, K+ purple
        3. Soredia present on upraised thallus margins or laminal, thallus unlobed except in the largest specimens; widely distributed in North America; misidentified as _C. cirrochroa_ in older North American literature.. _Caloplaca tominii_ Sav.
        3. Thallus esorediate, sometimes lobed, often fertile; spores one-celled; widespread on soil in exposed habitats in western and arctic North America........... (_Fulgensia_ spp.)
            4. Thallus with bordering lobes, the lobes concave to slightly convex............... _Fulgensia fulgens_ (Sw.) Elenk.
            4. Thallus without bordering lobes, more warty-squamulose in discrete areolate groups (schizidia).. _Fulgensia bracteata_ (Hoffm.) Räs.
1. Thallus K-
    5. Thallus vibrant lemon-yellow to yellow-green, weakly to strongly longwave UV+ (rhizocarpic acid)
        6. Thallus squamulose, usually fertile; spores minute (3-4 x 2-2.5 μm), many per ascus; low elevation western steppe to arctic and alpine tundra.. _Acarospora schleicheri_ (Ach.) Mass.
        6. Thallus granular or completely leprose; spores > 4 x 2 μm

7. Thallus usually extensive, completely leprose, containing rhizocarpic and vulpinic acids; spores non-septate, 2.5-5 µm long, borne in a stalked mazaedium; common and widespread on acidic soil......... .... *Coniocybe furfuracea* (L.) Ach.
[*Psilolechia lucida* (Ach.) Choisy is virtually indistinguishable from *Coniocybe furfuracea* when sterile, but contains atranorin. Because the thallus is yellow, use TLC or microcrystal test (GAoT recommended) rather than K test. Fertile *P. lucida* has spores 4-6 x 2-2.5 µm borne in an apothecium. *P. lucida* normally grows on rock in Europe but has been reported on soil in Michigan (as *Lecidea lucida* (Ach.) Ach., Harris, 1977)]

7. Thallus usually in small patches, sometimes dissolving into soredia; spores multiseptate, borne in black apothecia; usually subalpine to alpine in western North America, also in the arctic.............. ....(*Arthroraphis citrinella* (Ach.) Poelt)
syn.: *Bacidia citrinella*
B. flavovirescens

8. Thallus of small (< 0.5 mm), flat to slightly convex granules, becoming sorediate................... .... *Arthroraphis citrinella* var. *citrinella*

8. Thallus of larger (to > 1.0 mm), high-convex, esorediate granules.................................... ...... *Arthroraphis citrinella* var. *alpina* (Schaer.) Poelt

[This taxon is given species or subspecies rank by some authors; *Bacidia alpina* (Schaer.) Vain., *B. citrinella* subsp. *alpina* (Schaer.) Laundon]

5. Thallus pale to deep yellow, sometimes bright-yellow, always longwave UV-

9. Thallus pale yellow, containing usnic acid (some *Lecanora* species normally found on other substrates may rarely be found on soil; sterile, depauperate or juvenile specimens of *Squamarina* and *Lecanora* subg. *Placodium* may also key here)

9. Thallus yellow to deep-yellow, usnic acid lacking

10. Thallus bright-yellow, always leprose and non-effigurate, containing calycin and vulpinic acid; occasionally found on soil or moss, but usually on rock; widespread...... *Chrysothrix chlorina* (Ach.) Laund.
syn.: *Lepraria chlorina*

10. Thallus yellow, dull-yellow, or deep-yellow, granular or margins becoming effigurate-crenate......... ....(*Candelariella* spp.)
[Species are mostly indistinguishable when sterile. Beside the two species given below, other may occasionally be found on soil, though normally on other substrates, e.g., *C. vitellina*]

11. Thallus of small, round to slightly lobate, esorediate granules; spores 8/ascus; circumpolar arctic-alpine........ *Candelariella terrigena* Räs.

11. Thallus of small, round granules, sometimes sorediate; margins becoming effigurate-crenate; spores 16-32/ascus; circumpolar arctic-alpine................................ Candelariella placodizans (Nyl.) Magn.

Duncan, U. K. 1970. Introduction to British lichens. T. Buncle & Co., Albroath, England.

Hansen, E. S. 1983. Additions to the lichen flora of Greenland. Mycotaxon 18: 483-494.

Harris, R. C. 1977. Lichens of the Straits counties, Michigan. Univ. Michigan Herbarium, Ann Arbor.

Laundon, J. R. 1961. The taxonomy of sterile crustaceous lichens in the British Isles. 1. Terricolous species. Lichenologist 2: 57-67.

_____. 1981. The species of Chrysothrix. Lichenologist 13: 101-201.

Nimis, P. L. 1981. Caloplaca tominii new to North America. Bryologist 84: 222-225.

Poelt, J. 1965. Über einige Artengruppe der Flechtengattungen Caloplaca und Fulgensia. Mitt. Bot. Staatssamml. München 5: 571-607.

_____. Bestimmungsschlüssel Europäischer Flechten. J. Cramer, Lehre.

Thomson, J. W. 1979. Lichens of the Alaskan arctic slope. Univ. Toronto Press, Toronto.

_____. 1982. A further note on Caloplaca tominii Sav. in the Americas. Bryologist 85: 251.

REVIEW

Muma, Robert. 1985. A graphic guide to Ontario mosses. Toronto Field Naturalists. 24 pp.--Available from the author, 625 Rushton Road, Toronto, Ontario, Canada M6C 2Y8, for $2.00 each, $2.50 postpaid, $20.00 per dozen postpaid.

This illustrated guide, by a distant relative of Henry S. Conard, is a good introduction to the common genera of northeastern North American mosses. The genera are arranged by general aspect, each accompanied by a small sketch. There are 10 plates sorting the mosses by gametophytic features. These same genera are then catagorized by capsule morphology, followed by their classification based upon habitats. Other inclusions in this booklet are sections on moss ecology, classification and collecting.

Although not for the professional bryologist, Muma's Guide will be very useful to those wishing an introduction to the mosses without a total immersion. It is a good beginning booklet, hopefully whetting the appetite, and a launching point into more sophisticated literature.--*William R. Buck, New York Botanical Garden, Bronx, NY 10458-5126.*

THREE MOSSES NEW TO KENTUCKY INCLUDING HOMOMALLIUM INCURVATUM RE-ESTABLISHED IN NORTH AMERICA

Bruce H. Allen
Missouri Botanical Garden
P.O. Box 299
St. Louis, MO 63166

Gymnostomum angustifolium (=Tuerckheimia angustifolia), Heterocladium macounii and Homomallium incurvatum were recently collected in Kentucky for the first time. The report of Homomallium incurvatum re-establishes this moss in North America. All three species belong to an element of the southern Appalachian moss flora with affinities to the moss floras of Mexico and eastern Asia.

All collections are deposited in the author's private herbarium (bha), with duplicates deposited as marked. The nomenclature follows Crum and Anderson (1981).

Gymnostomum angustifolium Saito JESSAMINE CO.: on limestone cliffs, pallisades overlooking the Kentucky River near US 68 bridge, *Allen 2968, 2981* (bha, CINN, BUFF).

Zander (1978) considered this species nearly identical to the type species of Tuerckheimia and consequently transferred the species to that genus. Saito (1972) gave the habitat of G. angustifolium as "relatively dry limestone cliffs"; in Kentucky this moss is fairly common in dry cracks and fissures beneath jutting limestone ledges along the palisades overlooking the Kentucky River. Gymnostomum angustifolium is known in North America from Alaska, Arkansas, Florida, North Carolina, Tennessee, and Nuevo Leon, Mexico (Zander, 1978) and in Asia from Formosa, Korea and Japan (Saito, 1972). Since habitats identical to the Kentucky station for this moss occur along the Ohio River in southeastern Ohio it seems likely that this species may be found farther north in eastern North America.

Heterocladium macounii Best McCREARY CO.: on large boulders in flood plain along the Cumberland River, Cumberland Falls State Park, *Allen 4576* (bha, MO).

As noted by Crum and Anderson (1981), this species "...bears a striking resemblance to Thuidium pygmaeum." By far the best way to distinguish the two is to examine the stem paraphyllia. In Thuidium pygmaeum the paraphyllia are extremely abundant and appear to be extensions of the stem papillae. In Heterocladium macounii the paraphyllia are sparse and do not appear to arise from stem papillae. The Kentucky plants represent the slender "var. filescens" expression of Heterocladium macounii. In eastern North America H. macounii has been reported from North Carolina, South Carolina and Tennessee (Crum and Anderson, 1981); in western North America the species is known from Alaska, British Columbia, Washington, Oregon, Idaho (Lawton, 1971), and Puebla, Mexico (Crum and Anderson, 1981).

Homomallium incurvatum (Brid.) Loeske McCREARY CO.: on boulders along the Cumberland River, Cumberland Falls State Park, *Allen 4586* (bha, MO).

This species was first reported from North America by Bridel (1827); since then it has been variously included or excluded from the flora. Recently Crum and Anderson (1981) summarized the history of the species in North America and once again excluded it from the flora. As noted by Ando (1965) and Crum and Anderson (1981), Homomallium incurvatum bears a remarkable gametophytic resemblance to Pylaisiella, and most reports of Homomallium *incurvatum* from North America have turned out to be *Pylaisiella intricata*. The two species share a similar habit, long upper leaf cells, homomallous, lanceolate to subulate leaves and quadrate alar cells; but their sporophytes are completely different.

The collection reported here has sporophytes agreeing in all particulars to those of *H. incurvatum*. Furthermore, examination of a number of collections at *MO* indicates that the two species can be distinguished gametophytically by comparing their alar cells. In *H. incurvatum* the quadrate alar cells are more numerous, occupy a greater area in the alar region and extend farther up the leaf margin. The differences between the alar cells of these species can clearly be seen by comparing the illustrations in Crum and Anderson (*Pylaisiella intricata*, fig. 559c, 1981) and in Ando (*Homomallium incurvatum*, fig. 7g, 1965). *Homomallium incurvatum* has been reported from Europe, Kashmire, Turkestan, Siberia and Japan (Ando, 1965). The three species of *Homomallium* present in North America north of Mexico can be distinguished in the following key, adapted from Crum and Anderson (1981).

1. Leaves 0.5-0.8 mm long, erect or nearly so, not or only slightly homomallous, broadly short-acuminate...................... *H. adnatum*
1. Leaves 0.8-1.4 mm long, erect to spreading homomallous (at least at the tips of branches), abruptly and slenderly acuminate or gradually long-acuminate
    2. Median leaf cells 4-5:1; alar cells numerous, extending 1/4 the way up the margin; apex abruptly and slenderly acuminate, more or less serrulate; margins reflexed at base...... *H. mexicanum*
    2. Median leaf cells 7-9:1; alar cells few, 8-5 along margin in 4-7 rows; apex gradually long-acuminate, entire; margins plane.. *H. incurvatum*

Ando, H. 1965. A revision of the East-Asian species of *Homomallium*, a genus of Musci II. Hikobia 4: 161-177.

Bridel, S. E. 1827. Bryologia Universa. Leipzig.

Crum, H. A. & L. E. Anderson. 1981. Mosses of eastern North America. Vol. 2. New York.

Lawton, E. 1971. Moss flora of the Pacific Northwest. Nichinan.

Saito, K. 1972. Taxonomic and phytogeographic studies of specimens previously reported as *Molendoa sendtneriana*. J. Hattori Bot. Lab. 36: 163-170.

Zander, R. H. 1978. Synopsis of the genus *Tuerckheimia* (Pottiaceae). Misc. Bryol. Lichenol. 8: 25-28.

GYMNOSTOMIELLA ORCUTTII (POTTIACEAE)
NEW TO THE WESTERN COAST OF MEXICO

P. M. Eckel
Clinton Herbarium
Buffalo Museum of Science
Buffalo, NY 14211

Identification of a series of collections made by Richard Zander and myself in the state of Guerrero, Mexico, during a collecting trip in 1982 has produced three collections of *Gymnostomiella orcuttii* Bartr. new to the western regions of Mexico:

Mexico: Edo. Guerrero

1) 20 km S of Chilpancingo de los Bravos, on Fed. Rt. 95, roadside, crest of a hill in the Sierra de Igualatlaco, subject to afternoon fog, calcareous conglomerated rocks, farmland, with low herbs; composites, vetches, grasses, 4 Nov 1982, *Zander 5006* (BUF).

2) 44 km S of Chilpancingo de los Bravos, on Fed. Rt. 95 just S of Aqua de Obispo, tropical upland forest, *Acacia-Ficus-Ceiba*, soil with composites, grasses, fine white limestones with evidence of geothermal alteration: cuprous deposits unaffected by HCl, base of 20-foot cliff, roadcut, 4 Nov 1982, *Eckel 141885, Zander 5005* (both BUF).

Moss associate in these collections were *Aloina hamulus* (C. Müll.) Broth., *Barbula indica* var. *gregaria* (Mitt.) Zand., *Barbula orizabensis* C. Müll., *Globulinella globifera* (Hampe) Steere ex Steere & Chapm., *Hyophila involuta* (Hook.) Jaeg., *Moldendoa sendtneriana* (B.S.G.) Limpr., *Neohyophila sprengelii* var. *stomatodonta* (Card.) Zand. and *Weisia jamaicensis* (Mitt.) Grout. *Gymnostomiella orcuttii* assumed the attractive rosette habit-form of *G. globifera*, a dominant species in the assemblages, and the *Gymnostomiella* was at first not immediately distinguished from it. All collections of *Gymnostomiella* were scrappy and depauperate, and formed a small percentage of the total collections.

The large, lax basal cells of *Gymnostomiella orcuttii*, spathulate leaf shape, and C-shaped papillae on the leaf cells support the placement of this species in the Pottioideae, to which *Tortula*, *Acaulon*, *Pottia*, etc. belong. The costal anatomy, however, being without differentiated guide and stereid cells, is one major character state that lends support to its placement in some other family altogether and sets it apart from the dorsiventral structure of moss costae in the Pottioideae. This homogeneous costa was one of the attributes pointed out by Fleischer (1904) when he described the genus, although stereids may be present in some taxa (cf. *G. tanganyikae* fide De Sloover, 1977). For a key to species of *Gymostomiella* worldwide, derived from the literature, see De Sloover (1977, p. 176). Crum (1949) gives a good history of the placement of the genus, especially the attempts to place it in the Splachnaceae. Crum's (1949) suggestion that *Gymnostomiella* may deserve placement in a new family, the Splachnobryaceae, may have been addressed in Aune Koponen's recent publications regarding this taxon, but these were not available to me at the time of this writing.

The literature concerning the distribution of this species, which is endemic to the New World subtropic-tropic zone, is suggestive of a rather West Indian distribution: Crum & Anderson (1981) cite two specimens from Florida: Jackson and Citrus counties, one presumably from soil over rocks ("on limestone exposures along the Chipola River"), the other from the limestone wall of a sink. Breen (1963) cites stations in Dade, Jackson and Marion counties in Florida, and a duplicate specimen found at BUF is perhaps an additional Florida record: Alachua Co.: 1.9 mi N of Newberry, off St. Rd. 235, Crisman phosphate pits, soil, 28 Feb 1978, *R. Zander & D. Griffin 4993.* Other stations for this species exist in Puerto Rico and Haiti (Crum, 1949). The eastern Mexican material is from Veracruz and Tamaulipas (Crum, 1949). Two other collections reported suggest the distribution of this moss is broader and perhaps not specifically West Indian but may include arid stations on the Pacific coastal plain: an Ecuadorian station on the Galapagos Islands (Crum & Anderson, 1981) and the recent report from Brazil (Vital, 1984). The type locality is in Jamaica where it was collected on the "concrete walls of a reservoir," (Bartram, 1928). Bartram was intrigued by an occurrence of this species in the moss flora of North America (as he called it) sinces its congeners at that time were known to occur only in the Philippines and the East Indies, notably G. vernicosa (Hook.) Fleisch. (Bartram, 1928). The known distribution of the congeners of G. orcuttii includes central and northern Africa, eastern Asia and the West Indies (Wijk et al., 1962).

The distribution of collecting activity in Mexico seems to be skewed in favor of the eastern states, a fact that colors bryogeographic speculation. Collections made in the Pacific coastal regions of this country, so dominated by north-south trending mountains and tablelands, may enrich these discussions.

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Breen, R. S. 1963. Mosses of Florida. Univ. Florida Press, Gainesville.

Crum, H. A. 1949. The discovery of fruiting Gymnostomiella orcuttii in Mexico. Bryologist 52: 208-211.

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De Sloover, J. L. 1977. Note de bryologie africaine IX.—Andreaea, Racomitrium, Gymnostomiella, Thuidium. Bull. Jard. Bot. Nat. Belg. 47: 155-181.

Fleischer, M. 1904. Die Musci der Flora von Buitenzorg. Vol. 1. Leiden.

Vital, D. M. 1984. The occurrence of Gymnostomiella orcuttii Bartr. (Pottiaceae) in Brazil. Bryologist 87: 244, 245.

Wijk, R. van der, W. D. Margadant & P. A. Florschütz. 1962. Index Muscorum. Vol. 2 (D-Hypno). Utrecht.

ADDITIONS TO THE MOSS FLORA OF NEW MEXICO

Wm. F. Mahler
Herbarium
Southern Methodist University
Dallas, TX 75275

Thirteen species of mosses are added to the flora of New Mexico. The following records are based upon collections in the SMU Herbarium made by Brenda D. Mahler, K. E. Rogers, Eula Whitehouse and myself. Most of my collections are from the Sangre de Cristo Mountains in north-central New Mexico where field research was conducted in conjunction with the Fort Burgwin Research Center. In compiling the taxa, the reports of Mahler (1978), Ireland et al. (1981, 1984), Glime (1982), and Stark & Castetter (1982) have provided the basic data relative to the state records with general data from Lawton (1971) and Crum & Anderson (1981). Duplicate specimens have been sent to those herbaria as indicated and collection numbers without a collector's name peceding it are mine.

These taxa possess essentially a northern distribution with the southern limts of their geographic range in New Mexico:

Andreaea rupestris Hedw. TAOS CO.: near E side of upper ski lift, on old trail to Lake Williams, elev. ca. 3000 m, Taos Ski Valley, *8311*(UWSP).

Atrichum selwynii Aust. TAOS CO.: between Osha Park and Forest Road jct of 441 and 478 on 441, Bear Wallow Ridge Road, elev. 3075 m, Carson National Forest, *8161* (UWSP), *8146*.

Brachythecium plumosum (Sw.) Schimp. in B.S.G. MORA CO.: N of Tres Ritos and SE of Cerro Vista, elev. 3290 m, Carson National Forest, *8575*; TAOS CO.: along Rio Hondo between Arroyo Seco and ski lift, elev. 2600-2900 m, Carson National Forest, *Rogers 10485*.

Hygrohypnum ochraceum (Turn. ex Wils.) Loeske MORA CO.: near Cleveland, Rio la Casa, Aug 1921, *McAllister s.n.*

Lescuraea incurvata (Hedw.) Lawt. MORA CO.: near crossing of Rito la Presa and Forest Road 76, N of Tres Ritos, elev. 3200 m, Carson National Forest, *8580* (UWSP); OTERO CO.: Cloudcroft, *Whitehouse 13*.

L. saxicola (Schimp. in B.S.G.) Mol. ex Lor. TAOS CO.: jct of Rio Pueblo de Taos and Rio Grande on Hwy 96, Rio Grande State Park, *8559* (UWSP).

Pleurozium schreberi (Brid.) Mitt. CARTON CO.: Mogollon Mts., Gila National Forest, elev. 2600 m, *Shultz 1467* (specimen from W. A. Weber).

Pogonatum alpinum (Hedw.) Röhl. MORA CO.: N of Tres Ritos and SE of Cerro Vista, elev. 3290 m, Carson National Forest, *8571* (CANM, UWSP).

Polytrichum piliferum Hedw. MORA CO.: E side of Cerro Vista, elev. 3660 m, Carson National Forest, *8585* (UWSP), *8587*; TAOS CO.: ca. 8 km N of Puerto Cito, elev. 3075 m, Carson National Forest, *Mahler 319*; between Osha Park and Forest Road jct of 441 and 478 on 441, Bear Wallow Ridge Road, elev. 3075 m, Carson National Forest, *8147*.

Rhizomnium pseudopunctatum (Bruch & Schimp.) Kop. COLFAX CO.: on Forest Road 76 ca. 1.5 km S of jct of Osha Pass road & 76, ca. 6.4 km SE of jct of 38 & 76, elev. 3050 m, Carson National Forest, *8637* (CANM).

These taxa possess mainly an eastern distribution extending westward into New Mexico;

Campylium radicale (P. Beauv.) Grout TAOS CO.: Ojo Sarco on Hwy 76, *Mahler 305* (CANM, UWSP); 1.1 km N of jct 437 & 478 on 437, Lagunita Canyon, Carson National Forest, *8629* (CANM).

Climacium americanum Brid. COLFAX CO.: 1.5 km S of jct of Osha Pass road & 76, ca. 6.4 km SE of jct of 38 & 76, elev. 3050 m, *8647* (UWSP);

MORA CO.; near crossing of Rito la Presa and Forest Road 76, N of Tres Ritos, elev. 3290 m, Carson National Forest, *8572*; RIO ARRIBA CO.: ca. 1.6 km E of Hopewell Lake on Hwy 64, ca. 32 km W of Tres Piedras, elev. ca. 2850 m, *8613*.

Rhodobryum ontariense (Kindb.) Kindb. OTERO CO.: Cloudcroft, *Whitehouse 131a* (CANM).

The following eleven species and three varieties have been reported by Lawton (1971) and Crum & Anderson (1981), but have not been summarized previously in checklists or additions to the state bryoflora:

Brachythecium salebrosum (Web. & Mohr) Schimp. in B.S.G. TAOS CO.: between Garcia Park and Quintana Canyon on Forest Road 450, E of Talpa, Carson National Forest, *8181*; E side of Williams Lake at W base of Wheeler Peak, elev. ca. 3300 m, Wheeler Peak Wilderness Area, *8232* (UWSP); between Osha Park and Forest Road jct of 441 and 478 on 441, Bear Wallow Ridge Road, Carson National Forest, *Rogers 10377, 10378* (UWSP); Lawton, 1971.

Campylium stellatum (Hedw.) C. Jens. Lawton, 1971; Crum & Anderson, 1981.

Desmatodon cernuus (Hüb.) Bruch & Schimp. in B.S.G. Crum & Anderson, 1981.

Drepanocladus aduncus (Hedw.) Warnst. var. *polycarpus* (Bland. ex Voit) Roth Crum & Anderson, 1981.

D. aduncus var. *kneiffii* (Schimp. in B.S.G.) Mönk. Crum & Anderson, 1981.

Encalypta rhaptocarpa Schwaegr. SANTA FE CO.: Lake Peak, Santa Fe National Forest, elev. 3800 m, *Rogers 10445* (UWSP); Crum & Anderson, 1981.

Entodon sullivantii (C. Müll.) Lindb. Crum & Anderson, 1981.

Lescurea radicosa (Mitt.) Mönk. TAOS CO.: E side of Williams Lake at W base of Wheeler Peak, elev. ca. 3300 m, Wheeler Peak Wilderness Area, *8236* (UWSP); Crum & Anderson, 1981 (as *Pseudoleskea radicosa*).

Leskeella nervosa (Brid.) Loeske Crum & Anderson, 1981.

Polytrichum lyallii (Mitt.) Kindb. Lawton, 1971.

Pseudoleskeella catenulata (Brid. ex Schrad.) Kindb. Crum & Anderson, 1981.

Rhizomnium punctatum var. *elatum* (Schimp.) Kop. Crum & Anderson, 1981 (as *Mnium punctatum* var. *elatum*).

Tayloria acuminata Hornsch. Crum & Anderson, 1981.

Tomenthypnum nitens (Hedw.) Loeske Crum & Anderson, 1981.

I am indebted to Frank D. Bowers and Robert R. Ireland for identifying and verifying some of the taxa and Wm. A. Weber for providing an additional state record. I would like to acknowledge the aid of many individuals that contributed to the field research during the summers at Fort Burgwin, especially Eustaquio Castro-Mendoza, Richard T. T. Forman, John M. Pleasants, Ken E. Rogers, and Richard J. Vogl.

Crum, H. A. & L. E. Anderson. 1981. Mosses of eastern North America. Columbia University Press, New York.

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BRYUM GERWIGII (C. MÜLL.) LIMPR., NEW TO NORTH AMERICA

E. C. Wallace
2, Strathearn Road
Sutton, Surrey
England

On a visit to western Canada in July, 1982, collections were made on Plateau Mountain (50°13'N, 114°31'W) in Kananaskis Provincial Park, southwestern Alberta. Amongst the bryophytes collected was a small plant not identified in the field. It appeared to be a species of Bryum that A. C. Crundwell suggested might be Bryum gerwigii. My plant was compared with a specimen collected near Schaffhausen, Switzerland in 1908 by H. N. Dixon and W. E. Nicholson. This is the same locality from which type material was originally found. In the British Museum there are similar specimens from the same locality and from Kaiserstuhl collected by P. Culmann in 1895. Some of these plants are taller than the Alberta plants, however, the Albertan population grew on an exposed mountain top; quite different from the banks of the Rhine. Limpricht (1890-1895) thought this species was close to Bryum argenteum, but it also can be regarded as close to Bryum alpinum; the latter relationship does not seem correct to me.

Superficially, the plants resemble those of Bryum stirtonii, but are smaller, more slender, with concave, imbricate leaves. The small size, and sterile nature of the collections gathered up to now make this species easily overlooked. Its seemingly rare nature may partly be a result of it not being recognized in the field. Limpricht (1890-1895) presents a description and short discussion on p. 419 of volume 2.

Specimens are deposited in ALTA and my private herbarium.

Limpricht, K. G. 1890-1895. Die Laubmoose Deutschlands, Oesterreichs und der Schweiz. II. Bryineae. 853 pp. In: L. Rabenhorst's Kryptogamen-Flora von Deutschland, Oesterreich und der Schweiz, Vierter Band, ed. 2., Eduard Kummer, Leipzig.

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NEW RECORDS OF LICHENS FROM WASHINGTON STATE

Bruce D. Ryan
Department of Botany and Microbiology
Arizona State University
Tempe, AZ 85287

Since the checklist of Thomson (1969), a large number of additional species of lichens have been reported from Washington State in various articles, and major revisions in taxonomy and nomenclature have occurred. The thirty-six species listed below should also be added to the lichen flora of the state. Except where noted otherwise, the specimens cited below were collected by the author. The collections cited, except where preceded by "Ryan", are deposited in the herbarium of Western Washington University, Bellingham (WWB). Specimens cited as "Ryan", along with duplicates of most of the others, are in the author's herbarium (currently on loan to WWB). Many of these species are actually fairly common and widespread in the state, but only a few representative collections are cited in the present paper.

COLLECTION SITES—The collecting sites are described in the list below and coded by number; these numbers are then cited in the following species list.

1. GRANT CO.: Basalt outcrops, Crescent Bar Recreation Area, 11 km W of Quincy, 47°12'N, 119°59'W, 300 m.
2. GRANT CO.: Basalt outcrops near Vantage, 46°55'N, 122°00'W.
3. GRAYS HARBOR CO.: Near bridge over East Fork of Wishkah River, 47°05'N, 123°43'W. Collected by F. Rhoades.
4. ISLAND CO.: Seashore, Deception Pass State Park, S of Deception Pass, 48°24'N, 122°28'50"W.
5. ISLAND CO.: Exposed bluffs, Goose Hill, SE of Deception Pass, 48°24'N, 122°28'05"W, 120 m.
6. SKAGIT CO.: N side of Burroughs Is., 48°29'N, 122°42'W, 20 m.
7. SKAGIT CO.: Mt. Erie, S part of Fidalgo Is., 48°25'N, 122°40'W, 400 m.
8. SKAGIT CO.: North Cascades Hwy near Newhalem, 48°40'N, 121°15'W, 250 m.
9. SKAGIT CO.: Seashore, Rosario State Park, SW part of Fidalgo Is., 48°22'30"N, 122°40'W.
10. SKAGIT CO.: Shannon Point, NW part of Fidalgo Is., 48°30'30"N, 122°41'W.
11. SKAGIT CO.: W part of Washington Park, NW part of Fidalgo Is., 48°29'45"N, 122°42'W.
12. WHATCOM CO.: Bellingham, S of Western Washington University, 48°44'N, 122°29'W, 60 m.
13. WHATCOM CO.: NE side of Chuckanut Bay, 7 km S of Bellingham, 48°42'N, 122°30'W.
14. WHATCOM CO.: Chuckanut Is. (Dot Is.), 9 km S of Bellingham, 48°48'30"N, 122°30'W.
15. WHATCOM CO.: Subalpine forest, Kulshan Cabin Trail, 11 km S of Glacier, 48°48'N, 121°54'W, 1400 m.
16. WHATCOM CO.: Exposed bluffs above Legoe Bay, W side of Lummi Is., 48°41'N, 122°41'W, 100 m.
17. WHATCOM CO.: Limestone Road, 5 km N of Kendall, 48°57'N, 122°09'W, 150 m.
18. WHATCOM CO.: Mt. Baker Hwy, 5 km NE of Bellingham, 48°47'N, 122°55'30"W, 45 m.
19. WHATCOM CO.: Mt. Baker Hwy, intersection with Y Road, NE of Bellingham, 48°48'N, 122°20'W, 120 m.
20. WHATCOM CO.: Mt. Baker Hwy, 8 km E of Glacier, 48°55'N, 121°50'W, 450 m.
21. WHATCOM CO.: Mt. Baker Hwy, 11 km E of Glacier, 48°55'N, 121°50'W, 450 m.

22. WHATCOM CO.: Mt. Baker Hwy, 20 km E of Glacier, 48°54'N, 121°42'W, 600 m.
23. WHATCOM CO.: Sehome Hill, Bellingham, 48°44'N, 122°29'W, 300 m.
24. WHATCOM CO.: Silver Lake Campground, 6 km N of Maple Falls, 48°58'N, 122°04'W, 250 m.
25. WHATCOM CO.: Sulphur Creek lava flow, SE of Mt. Baker, 48°41'N, 121°46'W, 600 m.
26. WHATCOM CO.: SW slope of Squalicum Mtn., 7 km E of Bellingham, 48°26'N, 122°23'W, 200 m.
27. WHATCOM CO.: Seashore S of Wildcat Cove, Larabbee State Park, 12 km S of Bellingham, 48°39'N, 122°29'W.
28. WHITMAN CO.: Exposed basalt outcrops, Moscow-Pullman Hwy, 46°43'N, 117°10'W, 750 m.
29. YAKIMA CO.: *Artemisia tridentata* community, S side of Ahtahnum Ridge, 1 km SW of Union Gap, 46°31'N, 120°30'W, 400 m.
30. YAKIMA CO.: *Artemisia tridentata* community, Mt. Murray Wildlife Refuge, 15 km S of Ellensburg, 46°50'N, 120°33'W, 600 m.
31. YAKIMA CO.: *Artemisia tridentata* community, Umptahnum Road along Umptahnum Creek, 10 km SW of Ellensburg, 46°55'N, 120°40'W, 750 m.

SPECIES LIST

Acarospora sinopica (Wahlenb. *ex* Ach.) Korb.--21, on basalt, *3789*.

Agrestia hispida (Meresch.) Hale & Culb.--31, on soil, *3790*.

Bacidia alaskensis (Nyl.) Zahlbr.--9, on basalt, *3793* (det. W. J. Noble); 10, on basalt, *Ryan 3680*. This species occurs on the seashore just above high tide.

Calicium glaucellum Ach.--15, on conifer wood, *3681*.

Caloplaca atroalba (Tuck.) Zahlbr.--1, on basalt, *3795*.

Caloplaca laeta Magn.--14, on sandstone, *2094* (coll. F. Rhoades); 27, on sandstone, *3796* (det. W. J. Noble). This species occurs on the seashore just above high tide, and is very abundant at these sites.

Chaenotheca chrysocephala (Turn.) Th. Fr.--22, on wood, *3797*.

Chrysothrix chlorina (Ach.) Laund.--8, on basalt, *3810*.

Collema limosum (Ach.) Ach.--10, on soil, *3812* (det. G. Degelius); 17, on soil, *3811*. This species was very abundant at 17.

Coniocybe gracillima Vain.--20, on wood, *3799*.

Cyphelium lucidum (Th. Fr.) Th. Fr.--23, on bark, *Ryan 6003*; 26, on bark, *3800*.

Cystocoleus ebeneus (Dillwyn) Thwaites--3, on *Alnus rubra*, *4940*; 23, on bark, *Ryan 5467*; 25, on *Alnus rubra*, *3008*.

Dermatocarpon vagans Imsh.--31, on soil, *3801*.

Dimerella diluta (Pers.) Trev.--23, on bark, *3827*.

Lecanactis chloroconia Tuck.--10, on bark, 10 m, *3813*; 13, on sandstone, *3821*.

Lecanora christoi W. Weber--2, on basalt, *3814* (ver. R. A. Anderson).

Lecanora mellea W. Weber--31, on basalt, *3816*.

Lecanora palanderi Vain.--10, on driftwood on seashore, *3802*.

Lecidea aeruginosa Borr.--7, on burnt wood, *3803* (ver. R. A. Anderson).

Leptogium teretiusculum (Flörke *ex* Wallr.) Arn.--10, on serpentine rock, 10 m, *3817* (det. C. Wetmore).

Mycocalicium albonigrum (Nyl.) Fink--25, on wood, *1940* (coll. & det. F. Rhoades).

Melanelia exasperatula (Nyl.) Essl.--23, on bark, *2692*.

Niebla cephalota (Tuck.) Rund. & Bowl.--4, on bark, *3818* (det. J. W. Thomson); 11, on bark, 10 m, *3819*.

Normandina pulchella (Borr.) Nyl.--14, on moss over sandstone, *3820*.

Ochrolechia california Vers.--10, on *Alnus rubra*, 10 m, *3828* (det. I. M. Brodo).

Ochrolechia szatalaensis Vers.--6, on *Selaginella densa*, 20 m, *2077, 2078* (coll. F. Rhoades); 11, on *Selaginella densa*, soil and moss, *3822* (det. I. M. Brodo); 23, on moss, *3823, 3824.* New to North America. Reports of *O. upsaliensis* (L.) Mass. from lowland areas of the Pacific Northwest are based mostly on this species. It was very abundant at these sites.

Pilophorus nigricaule Sato--25, on lava rock, *2280* (coll. F. Rhoades).

Porina carpinea (Pers.) Zahlbr.--10, on *Alnus rubra*, 20 m, *3829*; 10, on *Acer circinatum*, *1342* (coll. F. Rhoades); 23, on *Alnus rubra*, *Ryan 6115*. This species was very abundant at these sites.

Porina chlorotica (Ach.) Müll. Arg.--12, on old brick, *3804.*

Punctelia stictica (Del. *ex* Duby) Krog--5, on rock, *1424* (coll. F. Rhoades); 16, on rock, *3805.*

Ramalina thrausta (Ach.) Nyl.--11, on shrub, 30 m, *4219*; 21, on bark, *4220*; 25, on bark, *4221.*

Rhizocarpon cookeanum Magn.--28, on basalt, *3830* (det. J. W. Thomson).

Rhizocarpon obscuratum (Ach.) Mass.--7, on rock, *3826*; 10, on granite and pebbles, *3825* (det. J. W. Sheard). This species was very abundant at these sites.

Rinodina polyspora Th. Fr.--24, on *Salix* sp., *3806.*

Thrombium epigaeum (Pers.) Wallr.--18, on soil, *3808.*

Xanthoparmelia mougeotii (Pers.) Hale--5, on rock, *1403, 2394, 3809*; 7, on rock, *Ryan 3724*; 11, on serpentine rock, *Ryan 4172* (det. M. E. Hale).

I thank Dr. Fred Rhoades and the various people who helped on identification, for their help on this project.

Thomson, J. W. 1969. A catalogue of lichens of the state of Washington. XI International Botanical Congress, Seattle, Washington. 59 pp.

Added by author after editor's typing:

Lecanora reptans Looman--29, on soil, *3879*: 30, on soil, *3792.* Though inconspicuous, this species was very abundant at these sites.

NOTES ON THE ILLINOIS BRYOPHYTE FLORA. I.

Bill N. McKnight
Section of Botany and Plant Pathology
Illinois Natural History Survey
Champaign, IL 61820

For the past five years the author has been enumerating and mapping the distribution of Illinois bryophytes. During this time it has become obvious that most of the state's bryoflora has not been adequately inventoried. It has also become apparent that some previously reported taxa are based on misdetermined specimens. Furthermore, there is reason to doubt the accuracy of the collection location given for many vouchers.

COMMENTS ON PREVIOUS STATE AND COUNTY RECORDS

McLeary and Redfearn (1979) published a list of 341 Illinois mosses. Included in this list are five species of Bruchia, with the report of B. hallii based on a Fulton County collection by John Wolf. A voucher of this collection in the herbarium of the University of Illinois at Urbana-Champaign (ILL) was recently annotated by Ann Rushing as a misidentification of B. flexuosa. The remaining three species are synonyms of B. flexuosa (Crum & Anderson, 1981).

The McCleary and Redfearn list also includes many dubious state and county reports, especially from Fulton and Menard counties. Most of these reports are apparently based on the 1878 publication of Wolf and Hall, which has previously been questioned or refuted by several authors: (Schuster, 1959, p. 47) "...the report [Mylia taylori] from Illinois... based on the old list of Wolf and Hall being wholly without merit."; (Schuster, 1980, p. 193) "Early reports of the species of Illinois...are so unreliable as to be meaningless", (p. 298) "...the unreliable list of Wolf & Hall."; (Crum & Anderson, 1981, p. 360) "...many other rarities in various herbaria, labeled as Illinois or Athens, Ill., may have come from the herbarium of E. Hall rather than been collected by him in Illinois."; and E. Hall, 13 Dec 1877 (Kibbe, 1953, p. 311) "John Wolf has one bad fault—he names things haphazard [sic] & finds to [sic] many new things..." In addition, Jansen (1979) did not locate any of these taxa during a survey of Fulton County in 1975-76. Based on these statements, vague voucher data and personal field experience in the area and across the state, the author suggests that all state and county records based exclusively on the Wolf and Hall list are questionable.

NEW ILLINOIS RECORDS

As a result of field and herbarium studies the following taxa are here reported new for Illinois:

Bryum muehlenbeckii BSG - POPE CO.: on wet shaded sandstone ledge, S side of Burden Falls, Shawnee National Forest, T11S R5E Sec.15 NE 1/4, 24 Mar 1976, *McKnight 16* (ILLS, MICH); on sandstone in ceder glade by waterfall, Jackson Hollow, Shawnee National Forest, T11S R5E Sec.31 SW 1/4, 5 Jul 1984, *McKnight 3930* (ILLS, MICH). Dups. ver. by H. Crum. Both specimens lack sporophytes. This rare montane taxon has previously been reported in eastern North America from Michigan, Newfoundland, New York, Oklahoma, Ontario, Pennsylvania and Tennessee (Sharp, 1930; Boardman, 1977; Crum & Anderson, 1981). Its occurrence in southern Illinois represents an interesting range extension.

Bryum klinggraeffii Schimp. *ex* Klinggr. - CHAMPAIGN CO.: on soil-covered bridge planks, T22N R11E Sec.1, 25 Aug 1984, *McKnight 3956* (ILLS, DUKE). Dup. det. J. Shaw. The plants had abundant crimson tubers, but no sporophytes.

Calliergon giganteum (Schimp.) Kindb. - LAKE CO.: emersed in Mud Lake Fen, Chain O'Lakes State Park, T46N R9E Sec.28 NE 1/4, 1 Nov 1981, *Moran 1863* (ILLS). The collection lacks sporophytes. This large calciphile is rather common further north.

Catoscopium nigritum (Hedw.) Brid. - COOK CO.: on tufa at edge of marl flat, SE side of Elgin, Bluff City Fen, T41N R9E Sec.30 N 1/2, 4 Nov 1984, *McKnight & Moran 4330* (ILLS, MICH), dup. det. H. Crum. McHENRY CO.; on tufa at interface with marl flat, Spring Hill Farm Fen, T43N R8E Sec.21 NW 1/4, 3 Nov 1984, *McKnight & Moran 4297* (ILLS). Both specimens lack sporophytes. The discovery of this unusual boreal taxon at the southern end of Lake Michigan is quite exciting, as these are apparently the southern most populations in North America. The closest reported populations are located 500 km northeast in the Straits region of Michigan's lower peninsula. It has also been reported from Iowa (Crum & Anderson, 1981). Bluff City Fen has recently been acquired as a nature preserve but Spring Hill Fen is jeopardized by mining activities.

Distichium capillaceum (Hedw.) BSG - JO DAVIESS CO.: in moist, cool limestone crevices on talus of river bluff (algific slope), Yonker's Bluff, 5 km NNE of Belluvue, Iowa, T27N R1E Sec.28 S 1/2, 5 Jun 1985, *Schwegman s.n.* (ILLS). The collection lacks sporophytes. This taxon was previously know in Illinois only from a fossil plant assemblage in the far southeastern part of the state, Jackson County (Jackson & Miller, 1983).

Ditrichum lineare (Sw.) Lindb. - CLARK CO.: on soil at edge of cultivated field and woods, Rocky Hollow, 13 km SE of Martinsville, T9N R12W Sec.5 SW 1/4, 27 Nov 1982, *McKnight 2409* (ILLS). Sporophytes are present on some of the plants.

Dumortiera hirsuta (Sw.) Nees - POPE CO.: on sandstone at base of waterfall, Jackson Hollow, Shawnee National Forest, T11S R5E Sec.31 SW 1/4, 25 Jul 1984, *McKnight 3922* (ILLS). The collection lacks sporophytes. The population has diminished substantially since first seen in 1974 when it completely covered the base of the waterfall.

Grimmia plagiopoda Hedw. - CHAMPAIGN CO.: on shaded limestone bridge abutment, S side of Salt Fork River 4 km NNE of Sidney, T19N R10E Sec.27, 27 Feb 1983, *McKnight 2614* (ILLS, MICH). On old concrete tombstone base, Mt. Hope Cemetery, Champaign, 4 Sep 1984, *McKnight 3991* (ILLS, MICH). On old concrete tombstone, Riverside Cemetery, Mohomet, T20N R7E Sec.15 NE 1/4, 8 Sep 1984, *McKnight 4021* (ILLS, MICH). Dups. det. H. Crum. The last two collections have sporophytes. A thorough search of the bridge abutments and cemeteries in Champaign County failed to reveal any additional populations. This very attractive little moss is probably more common than is generally assumed.

Scorpidium scorpioides (Hedw.) Limpr. - McHENRY CO.: in shallow water on marl flats, among sedges and in seeps on side of gravelly glacial slope, Spring Hill Farm Fen, T43N R8E Sec.21 NW 1/4, 3 Nov 1984, *McKnight & Moran 4294, 4295* (ILLS); 22 May 1985, *McKnight & Moran 4553, 4554, 4556, 4561, 4564* (ILLS). In shallow water on marl among sedges, Stern's Fen, T44N R8E Sec.28 NE 1/4, 3 Nov 1984, *McKnight & Moran 4314* (ILLS), *McKnight & Moran 4318* (ILLS, MICH), dup. ver. H. Crum. All collections lack sporophytes. This beautiful, robust calciphile was previously known in Illinois from a fossil plant assemblage in the extreme southeastern part of the state (Jackson & Miller, 1983). Unfortunately, the hydrology of Stern's Fen is being drastically altered due to nearby stream channelization and, as mentioned above, the marl flats at Spring Hill Farm Fen are imperiled by mining activities.

Thanks are extended to Howard Crum, Ann Rushing and Jonathan Shaw for assisting with specimen determinations and to Charles Arzeni, Malcolm Sargent, Robbin Moran and several colleagues at the Natural History Survey for reviewing the manuscript.

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STUDYING BRANCH PATTERNS IN BRYOPHYTES

Barbara M. Thiers
New York Botanical Garden
Bronx, NY 10458

Nearly all bryophyte gametophytes produce branches of some sort. Branching increases the surface area for light, water and mineral absorption, and multiplies the number of growing points of the plant. The gametophytes of mosses, hepatics and hornworts differ widely not only in morphology, but also in the way they achieve a branched growth habit, and analysing branch differences can provide important clues to the relationships among taxa.

The study of branching in bryophytes has usually involved only the study of branch development. This subject has been well studied, especially recently (Schuster, 1966; Crandall, 1969, 1984; Renzaglia, 1978, 1982), and a variety of branch types have been identified and described. The study of branch development has contributed greatly to the classification of the Hepaticae, in which at least 12 developmental patterns have been described.

Branch development studies have paved the way for a broader approach to the use of branching in bryophyte taxonomy, a "whole plant" approach. This elicits taxonomically important variation from the position, developmental type, and relative length of branches, as well as the sequence of leaves on branches, and their spatial relationship to sex organs. These ingredients collectively determine the branch pattern of a bryophyte gametophyte, and the purpose of this article is to describe some techniques for gathering data on branch patterns and some possible uses of such data.

The techniques described here will probably work for thalloid as well as leafy bryophytes, although the simpler the plant, the fewer will be the rewards obtained from studying the branch pattern. Whatever plants are used, they should be easily removable from the substrate so that the entire plant or a large portion of it can be brought into the lab for examination. Herbarium specimens can also be used. Choosing fertile material for examination will allow a larger number of potentially important branch features to be observed.

A minimal amount of equipment is needed: a dissecting scope with an intense light source (a compound scope for very small plants); possibly a clearing agent (e.g., chloralhydrate) for strongly pigmented plants or a water soluble stain (e.g., gentian violet) for very pallid plants; fine dissecting needles and forceps; and a pencil and paper for recording observations. Separation of individual whole plants from a bryophyte colony is usually impossible because the older parts are decayed and broken. Therefore, analysis is actually based on stem units, consisting of a main stem and the branches derived from it. Usually these units can be identified readily once a colony has been moistened and removed from all or most of its substrate. After isolation, a stem unit can be laid out in a shallow dish or a microscope slide (I prefer 2 x 3" slides), and should be remoistened periodically, because the plant is far less brittle when wet. The branches should be spread as widely as possible for ease of observation, but care should be taken not to break them until observations have been made.

In my experience, the easiest way to record the different aspects of a branch system is to diagram it. To do this effectively, you must establish a series of symbols for different plant parts such as stems, leaves, branches of different types, sex organs and perichaetial leaves, and develop a way to indicate plane of branching for plants that are not dorsiventrally flattened.

Start by making the diagram reflect the stem unit exactly in the number of leaves on a stem, their sequence, the exact position of sex organs and perichaetial leaves, and the number, length, position an plane of branching. Most likely, it will become apparent with time that some of this detail is insignificant, and can be ignored. If the stem unit is too large and complex to observe and draw easily, make a rough sketch of the main axis to indicate the position of major branches, then remove each main branch and draw it individually on a separate sheet. Some detail, such as leaf sequence on very small branches may be difficult to ascertain using a dissecting scope. In such cases, mount the specimen in Hoyer's fluid (gum arabic and chloralhydrate) or in water with a drop of stain, and observe with low power (5x to 10x) under a compound microscope. The inherent variability of the bryophyte gametophyte must always be kept in mind, and data should be collected from as wide variety of plants as possible.

Once diagrams have been made for the groups under comparison (species within a genus; different populations of a species), the differences observed must be described. This is one of the most difficult and critical steps in branch pattern analysis. One must determine which differences are significant, and describe them in terms of discrete characters, each with two or more contrasting states. For example, on character might be "gynoecial position" and the contrasting character states could be "on main axes" versus "on secondary branches." If a scheme for characterizing the branch pattern of a group is to be understood and used by other workers, it must be flexible enough to allow for a reasonable amount of variability, and it must contain a minimum of terms with special definition, i.e., jargon.

After the branch pattern variation in the group under scrutiny has been interpreted in terms of discrete characters, comparisons can be made for taxonomic purposes, assuming that significant variation is found. Characters can be used in keys and descriptions to help differentiate between taxa, and branching in different populations of a single species can be used to study variation within it. For example, I found that branch patterns in collections of Leucolejeunea clypeata (Schw.) Evans growing near the northernmost limit of its distribution (Pennsylvania, Connecticut) differed markedly from those collected near the center of distribution (North Carolina, Virginia). If enough plants were diagrammed, statistical methods could be used to determine the significance of branching differences observed in different populations. However, qualitative descriptions not requiring numerical documentation, for example, "population A showed variation in branch type, but population B did not", may be just as useful for taxonomic purposes.

I found that much variation potentially useful for taxonomy could be found by studying the branch systems of species of Lejeuneaceae (Hepaticae) (Thiers, 1984-1985), and I suspect that this may prove true for other groups as well. It is probably also important to identify those bryophyte groups that seems to have no taxonomically useful variation in their branch systems. Therefore, I hope that bryologists will investigate the branch system of a group when they conduct taxonomic research upon it; making a diagram or two adds relatively little time to the process of writing up a collection, and may yield valuable information.

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Crandall-Stotler, B. 1984. Musci, hepatics and anthocerotes--an essay in analogues. In: Schuster, R. M. (ed.), New manual of bryology 2: 1093-1129. Hattori Botanical Laboratory, Nichinan.

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THE 1985 A. LEROY ANDREWS FORAY

Cyrus B. McQueen
Department of Botany
The University of Vermont
Burlington, Vermont 05405

The tenth annual A. LeRoy Andrews Foray was held in the "northeast kingdom" of Vermont on September 20-22, 1985. The foray was based at the Craftsbury Ski Touring Center on the southeastern shore of Lake Hosmer about 5 km north of Craftsbury Common, Vermont. Cyrus B. McQueen was responsible for the organization of the foray. The 52 participants came from Connecticut, Maine, Maryland, Massachusetts, New Hampshire, New Jersey, New York, Pennsylvania and Vermont. All field trips were made to the high peaks region of the Sterling Range in Lamoille County.

The foray began on Friday afternoon. Participants were greeted in Vermont by mountains dotted with flames of fall colors and tropical temperatures in the high 80's F. Early arrivals visited the cedar swamps surrounding the ski center where Sphagnum warnstorfii is common. Bob Jervis presented an excellent illustrated talk on the natural history of Vermont. Musical entertainment for the evening was provided by Cyrus McQueen on fiddle and Jerry Jenkins on flute and piano. Together they played a combination of French-Canadian and old-time fiddle tunes.

On Saturday the participants headed towards the Sterling Range of the Green Mountains in Stowe. Early morning cloud cover shrouded Mt. Mansfield, the highest peak in the Green Mountains, and prevented the opening of the toll road up the mountain. Most of the participants elected to climp up the short, but steep trail in Smuggler's Notch to Mt. Sterling. Smuggler's North is one of the few known localities of Plagiobryum zierii, however, it was not seen by anyone in the foray. The foray quickly became a Sphagnum foray to the dismay of a few and the overwhelming approval of the majority. Dick Andrus, Antone Damman, Nancy Slack and Cyrus McQueen aided everyone in field identification of Sphagnum species. Some of the species found in the elevations above 3000 ft. were S. magellanicum, S. fallax, S. fuscum, S. squarrosum, S. russowii, S. girgensohnii, S. centrale and S. fimbriatum.

The majority of the participants reluctantly left Smuggler's Notch and proceeded to several wetland sites in the Sterling Valley north of Stowe. Some chose to keep their feet dry and visited Moss Glen Falls. The spectacular falls are over 100 ft. high and support a number of different species of Fontinalis. The majority of the participants visited Molly Bog a few miles north of Stowe. Here they were treated with a wide diversity of sphagna. Species collected in the bog included S. centrale, S. magellanicum, S.russowii, S. girgensohnii, S. rubellum, S. fallax, S. angustifolium, S. fuscum and S. majus. Dick Andrus was excited over finding some highly colored specimens of S. cuspidatum. The plants had a pinkish orange color to them that is not frequently observed. Again the group reluctantly left the site, with some confusion over where the trail was supposed to be, and headed for Joe's Pond.

Joe's Pond, located a few hundred yards northeast of Molly Bog, is a fen that supports a large number of minerotrophic sphagna. The most exciting find was S. riparium, which is not rare, but is usually dismissed as just another of the common species of the S. recurvum group. However, its identity was clear by the presence of its large apical bud and distinctive stem leaves split down the middle. Other species found in the fen were S. teres, S. fimbriatum, S. flexuosum, S. angustifolium, S. fallax, S. russowii, S. magellanicum and S. centrale. The site seemed just right for S. subfulvum, but it was not found despite a concerted effort led by

Dick Andrus. A wet and weary group of bryologists and lichenologists left the site in the late afternoon.

After supper several participants gave illustrated presentations. Hank Webster discussed his current research on spore germination in *Pogonatum*, Cyrus McQueen discussed the effects of major ions on *Sphagnum* protonemata growth and development, and Robert Thomas discussed the results of his research on sugar transport in *Polytrichum*. Nancy Slack shared her photographs of well-known and not-so-well-known bryologists who attended the International Bryoecological Conference in Budapest, Hungary in August, 1985. At the business meeting following the presentations, Bill Buck volunteered to organize next year's foray. The foray will be based at a summer camp on the eastern tip of Long Island.

Cyrus McQueen and Jerry Jenkins, with the addition of Cheryl McQueen playing guitar, provided musical entertainment in the evening. Robert Thomas persuaded people to dance. Both Robert and Cyrus called a square and a reel. The dancers learned quickly and were soon performing the figures without the aid of a caller.

Due to the long distances traveled, many participants left for home after breakfast on Sunday. Jerry Jenkins led a group up the toll road of Mt. Mansfield to examine the predominantly alpine flora on the summit. Cyrus McQueen led a small, but enthusiastic group to Bear Swamp, a forested peatland located near The Center for Northern Studies in Wolcott. The swamp supported a rich bryophyte flora. Species found included *Sphagnum centrale*, *S. magellanicum*, *S. angustifolium*, *S. fallax*, *S. russowii*, *S. girgensohnii* and *S. subtile*. The most exciting finds were *S. wulfianum* and *S. quinquefarium* with mature sporophytes. Most participants were on their way home before lunch.

The success of the foray was due to the effort of many people. I would like to thank Nancy Slack for placing the ads for the foray and the first mailing notices in addition to invaluable organizational suggestions. Everett Marshal and Rose Paul of the UVM Department of Botany and Jerry Jenkins served as excellent guides. I also acknowledge the UVM Department of Botany for use of microscopes and other essential equipment. Finally, thanks to all participants who share a love for lichens and bryophytes. The nomenclature used for *Sphagnum* follows Andrus (1980).

Andrus, R. E. 1980. Sphagnaceae (peat moss family) of New York State. Bull. N. Y. State Mus. 442: i-vi, 1-89.

The 1986 A. LeRoy Andrews Foray will be held September 19-21, 1986 at Peconic Dunes Camp of Suffolk County, Long Island, New York. For further information or to be put on the mailing list, write to: William R. Buck, New York Botanical Garden, Bronx, NY 10458-5126.

LICHENS OF THE NEW JERSEY PINE BARRENS
COLLECTED ON THE SEVENTH A. LEROY ANDREWS FORAY, 1982

Richard C. Harris
New York Botanical Garden
Bronx, NY 10458

At almost every foray which I have attended someone comments that it would be a good idea to publish a list of the species encountered. Since there is now an outlet for these in *Evansia*, I am presenting this list to encourage others to do likewise or to send me their records for inclusion in reports for the Andrews Forays since 1982. Also, since relatively little is known about the distribution of lichens (compared to ferns and flowering plants), such lists provide useful information.

Most of the species encountered are those known from similar habitats on Long Island and throughout the northern Coastal Plain. Of particular interest were *Buellia vernicoma*, *Calicium subquercinum*, *Caloplaca camptida*, *Pertusaria ostiolata* and a sterile member of the mostly tropical family Asterothyriaceae (possibly referable to *Gyalideopsis*).

The foray took place September 18, 19 and was expertly planned and led by Richard Forman, the authority on the Pine Barrens. Collections cited were made by myself (no prefix), Lois Brako (B) and William Buck (Buck). We visited four localities as listed below. Vouchers are deposited in NY.

A: Oak-pine woods, Atsion, on Mullica River, 8 mi S of Hammonton, Burlington County.
BSE: Southern swamp forest, Bear Swamp East, 3 mi NW of Haleyville, Cumberland County.
EPP: Dwarf pine plains, East Pine Plains, 3 mi SW of Warren Grove, Ocean County.
QB: *Chamaecyparis* swamp, Quaker Bridge on Batsto River, 5 mi SE of Atsion, Burlington County.

Anisomeridium nyssaegenum (Ellis & Everhart) comb. nov. *Zignoella nyssaegena* Ellis & Everhart, Proc. Acad. Sci. Nat. Philadelphia 1893: 137. 1893. Holotype: on outer bark of living *Nyssa multiflora*, Newfield, New Jersey, Nov 1892, *Ellis* (NY). Syn.: *Arthopyrenia willeyana* R. C. Harris, *Anisomeridium juistense* (Erichs.) R. C. Harris in James et al. A: *Quercus*, 16411.
This is the most common pyrenolichen in eastern North America. It is not surprising that it was collected and described by Ellis, especially since the algal layer is often inconspicuous in dry habitats.

Bacidia chlorantha (Tuck.) Fink--QB: *Chamaecyparis*, B4908. The ascus type, structure of the apothecium and chemistry suggest this species is best assigned to the Fuscideaceae Hafellner. A new genus will have to be described for it.

B. schweinitzii (Fr. ex Michen.) Schneid.--BSE: *Quercus*, 16469, *Acer*, B4923, dead tree, Buck 8969.

Bacidia sp.--BSE: *Fagus*, 16455. Apothecia small, whitish; exciple filled with small brownish crystals; spores 4-locular, 20-30 × 1.5 μm.

Buellia curtisii (Tuck.) Imsh.--BSE: *Fagus*, 16454, *Magnolia*, 16461.

B. polyspora (Willey) Vainio--A: *Quercus* twigs, 16412, *Quercus*, B4898; BSE; *Acer*, B4924,

B. stillingiana J. Stein.--BSE: *Acer*, B4925; QB: *Quercus*, B4909.

B. vernicoma (Tuck.) Tuck.--BSE: *Magnolia*, 16456, *Acer*, B4926.

Calicium subquercinum Asah.--BSE: *Liriodendron*, Buck 8970.

Caloplaca camptida (Tuck.) Zahlbr.--QB: *Quercus*, B4910.

Candelariella efflorescens Harris & Buck--A: *Quercus*, 16420.

C. xanthostigma (Ach.) Lettau--A: *Quercus*, 16436, B4899.

Cetraria viridis Schweinitz--QB: *Chamaecyparis*, B4912.

Chaenotheca xyloxena Nâdv.--BSE: lignum, Buck 8970.

Cladina subtenuis (des Abb.) Hale & Culb.--A: 16439, B4901: EPP: 16495.

Cladonia atlantica Evans--A: 16438; BSE: B4927; EPP: 16491, 16494.

C. bacillaris Nyl.--A: lignum, 16424; BSE: lignum, 16476; QB: bark of dead *Chamaecyparis*, 16452, lignum, B4911.

C. caespiticia (Pers.) Flörke--BSE: *Magnolia* trunk, 16459.

C. cristatella Tuck.--EPP: 16496.

C. dimorphoclada Robbins--EPP: 16492, B4942.

C. grayi Merr. ex Sandst.--A: 16423, 16440; BSE: B4928; EPP: 16490; QB: 16446.

C. incrassata Flörke--EPP: base of pine, 16488; QB: rotten stump, 16442.

C. ochrochlora Flörke--BSE: 16482.

C. pleurota (Flörke) Schaerer--EPP: B4941.

C. santensis Tuck.--QB: *Chamaecyparis* trunk, 16450.

C. sobolescens Nyl. (*C. clavulifera* Vainio)--A: B4900.

C. squamosa Hoffman--QB: *Chamaecyparis* trunk, 16453.

C. strepsilis (Ach.) Vainio--A: 16425; EPP: 16489.

C. uncialis (L.) Wigg.--A: B4902; EPP: 16493, B4943.

C. verticillata (Hoffm.) Schaerer--EPP: B4944; QB: on stump, 16449.

Foraminella subambigua (Gyeln.) S. F. Meyer--BSE: *Fagus*, 16477; QB: *Quercus*, B4913. Although Meyer (1985) reversed her 1982 typification of *Parmeliopsis*, Hawksworth (1985) has shown that her original proposal was correct that *Parmeliopsis* (=*Imshaugia* S. F. Meyer) should be used for *P. aleurites* and *P. placorodia* and *Forminella* for the *P. ambigua* group.

? Gyalideopsis sp.--QB: on horizontal *Chamaecyparis* log, 16444. Since the collection lacks ascomata, it cannot be definitely assigned to a genus within the Asterothyriaceae. However, *Gyalideopsis* Vezda is suggested by the fan-shaped hyphophores with toothed margins. This is supported by the corticolous substrate (much of the family is foliicolous). Fertile collections are much desired. The thallus formed conspicuous round, shiny silver-gray patches growing in deep shade of the *Chamaecyparis* swamp.

Haematomma sp.--A: *Quercus*, 16427; BSE: *Nyssa*, 16471. This species, first noted by Brodo on Long Island, is soon to be formally described by him.

Heterodermia hypoleuca (Muhl.) Trevis.--A: *Quercus*, 16434.

H. obscurata (Nyl.) Trevis.--A: *Quercus*, 16428, B4903.

Hypotrachyna livida (Tayl.) Hale--BSE: *Acer*, B4929, *Nyssa*, B4945.

Lecanora caesiorubella Ach. subsp. *prolifera* (Fink in Hedr.) Harris in Vezda--BSE: *Acer*, 16466, B4930; EPP: *Quercus*, 16487; QB: *Quercus*, B4914.

L. hybocarpa (Tuck.) Brodo--A: *Quercus*, 16416; BSE: *Acer*, B4931; QB: dead *Quercus*, B4915.

L. thysanophora R. C. Harris ined.--BSE: *Nyssa*, 16470.

Lecidea erratica Koerber--EPP: Buck 8973.

Lepraria finkii (B. de Lesd. in Hue) comb. nov. *Crocynia finkii* B. de Lesd. in Hue, Bull. Soc. Bot. France 71: 348. 1924. Lectotype (selected here): Iowa, Fayette, 7.VII.1894, Fink, distributed as Cummings II: 93 (NY).

BSE; *Nyssa*, 16468.

The author citation of this species presents a problem not envisioned by the drafters of the International Code of Botanical Nomenclature. Hue examined the specimens and wrote the descriptions but died without providing names for the taxa. Bouly de Lesdain, in preparing the posthumous manuscript, supplied the names and attributed them to himself. This situation is not specifically covered by *ex* (one author adopting another's name) or *in* (a species described in another author's work). However, after some discussion with Drs. R. McVaugh and E. Voss (both members of the Nomenclature Committee at that time), it was decided that "B. de Lesd. in Hue" was most appropriate. Several other names for this species were published simultaneously, but I have chosen *C. finkii* as specimens and notes set aside by Fink (now at MICH) led me into working on *Lepraria*. In my opinion Bruce Fink has been undervalued and is otherwise not much honored among lichen epithets. Additional synonymy will be presented elsewhere. The species is characterized by atranorin, zeorin, stictic acid agg. and unknowns.

Lepraria sp.--A: *Quercus*, 16409, 16410; QB: *Chamaecyparis*, 16451. This taxon contains atranorin and zeorin and is often called *L. incana* (L.) Ach. but, since the chemistry of the type is unknown, I am not using the name. Also this species does not seem to me to have a typical *Lepraria* morphology and may in fact be a sterile *Lecanora* or *Haematomma*.

Ochrolechia pseudopallescens Brodo ined.--QB: *Quercus*, B4919.

Parmelia squarrosa Hale--A: *Quercus*, 16419.

Parmeliopsis aleurites (Ach.) Nyl.--QB: *Chamaecyparis*, 16453.

Parmotrema perforatum (Jacq.) Hale--BSE: *Nyssa*, B4948.

P. reticulatum (Tayl.) Choisy--BSE: *Acer*, B4934.

Pertusaria macounii (Lamb) Dibben--QB: *Quercus*, B4921.

P. multipunctoides Dibben--BSE: *Magnolia*, 16457, *Fagus*, 16458, *Carpinus*, 16463.

P. ostiolata Dibben--BSE: *Fagus*, 16478.

P. paratuberculifera Dibben--A: *Quercus*, 16432, 16433; BSE: *Nyssa*, 16462, *Acer*, 16475, *Quercus*, B4935.

P. trachythallina Erichs.--A: *Quercus*, 16422; BSE: *Acer*, B4936, B4937 .

P. velata (Turn.) Nyl.--BSE: *Acer*, B4938.

Phaeocalicium polyporaeum (Nyl.) Tibell--A: Buck 8964; BSE: B4932.

Phaeographis inusta (Ach.) Müll. Arg.--BSE: *Ilex*, 16460, *Carpinus*, 16465. Similar to *P. dendritica* (Ach.) Müll. Arg. but lacking norstictic acid. *Phaeographis dendritica* is commonly reported from the northeast but those specimens examined by me are either *P. inusta* or *Graphis scripta* (L.) Ach.

Phaeophyscia rubropulchra (Degel.) Essl.--BSE: base of *Acer*, 16473.

Physcia americana Merr. in Evans & Meyrow.--A: *Quercus*, 16418.

P. millegrana Degel.--A: *Quercus*, B4906.

Placynthiella oligotropha (Laundon) Coppins & James--A: 16421 pr.p.

P. uliginosa (Ach.) Coppins & James--A: 16421 pr.p.

Porina cestrensis (Tuck. ex Michen.) Müll. Arg. s.lat.--BSE: *Acer*, B4939. There is a continuum in spore characters between *P. cestrensis* s.str. (8-locular and clavate) and *P. rhaphidosperma* Müll. Arg. (multilocular and filiform). It is tempting to speculate that this is due to hybridization. Brodo's reports of *P. hibernica* James & Swinsc. from Long Island belong here.

Punctelia subrudecta (Nyl.) Krog--A: *Pinus*, 16417; BSE: *Quercus*, B4933, *Nyssa*, B4947.

Pycnothelia papillaria (Ehrh.) Duf.--EPP: 16484.

Pyrenula pseudobufonia (Rehm) comb. nov. *Clypeosphaeria pseudobufonia* Rehm, Ann. Mycol. 2: 176. 1904 ≡ *Massaria texana* Rehm, Ann. Mycol. 5: 517. 1907. Type: Texas, Mt. Spanish, on *Quercus*, W. H. Long 567, comm. Atkinson. Isotypes in CUP-Atkinson. Syn.: *Pyrenula neglecta*

R. C. Harris.
BSE: *Carpinus*, 16467, *Fagus*, 16481.

Pyrrhospora varians (Ach.) comb. nov. *Lecidea varians* Ach., Syn. meth. lich. 38. 1814. Type not examined.
EPP: *Quercus*, 16486; QB: *Acer*, 16441.
This species has always seemed anomalous to me. However, examination of the ascus in the light of Hafellner (1984) suggests placement in the Lecanoraceae. The filiform conidia and presence of xanthones in the thallus support this placement. Within the Lecanoraceae sensu Hafellner it comes closest to *Pyrrhospora quernea* (Ach.) Koerber. The apothecial and spore characters are very similar except for anthraquinones. Since I do not regard this sufficient to distinguish genera, I am transferring *L. varians* to *Pyrrhospora*.

Pyxine sorediata (Ach.) Mont.--A: *Quercus*, 16437; QB: *Quercus*, B4918.

Scoliciosporum chlorococcum (Stenh.) Vezda--A: branch of *Pinus*, 16429.

Trapeliopsis flexuosa (Fr.) Coppins & James--A: lignum, 16430, *Pinus*, 16431, burnt wood, 16435; EPP: lignum, 16485.

T. granulosa (Hoffm.) Lumbsch--EPP: on sand, 16485.

Trypethelium virens Tuck. ex Michen.--BSE: *Carpinus*, 16464, *Ilex*, Buck 8971.

Tuckermanopsis ciliaris (Ach.) Gyeln.--QB: *Chamaecyparis*, B4920.

Usnea strigosa (Ach.) A. Eaton--BSE: *Acer*, B4940.

Hafellner, J. 1984. Studien in Richtung einer natürlichen Gliederung der Sammelfamilien Lecanoraceae und Lecideaceae. Beih. Nova Hedwigia 79: 241-371.

Hawksworth, D. L. 1985. The application and citation of the generic name Parmeliopsis (Lecanorales, Parmeliaceae). Pl. Syst. Evol. 149: 303-307.

Meyer, S. L. F. 1982. Segregation of the new lichen genus Foraminella from Parmeliopsis. Mycologia 74: 592-598.

_____. 1985. The new lichen genus Imshaugia (Ascomycotina, Parmeliaceae). Mycologia 77: 336-338.

PHILONOTIS CAPILLARIS / PHILONOTIS ARNELLII

J. H. Field
34 Wells Green Road
Solihull, West Midlands
England

In Index Muscorum, the date for the Lindberg description of Philonotis capillaris (Hedwigia 6: 40) is given as 1867, whereas the description of Philonotis arnellii by Husnot (Musc. Gall. 268, fig. 74) is 1890.

Modern authors have combined the two taxa. Since Lindberg's description of Philonotis capillaris appeared previous to that of Philonotis arnellii by Husnot, the correct name for the combined taxon should be Philonotis capillaris Lindb.

My emended diagnosis of this species was published in the Proc. Birmingham Nat. Hist. Soc. 23(2): 104, 105. 1976.

MOSS

Plants of Emotion:

Riotous Emerald Joy

In the warm, light Rain.

Robert Dirig, Copyright, 1984.
Dedicated to John W. Hollister.

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